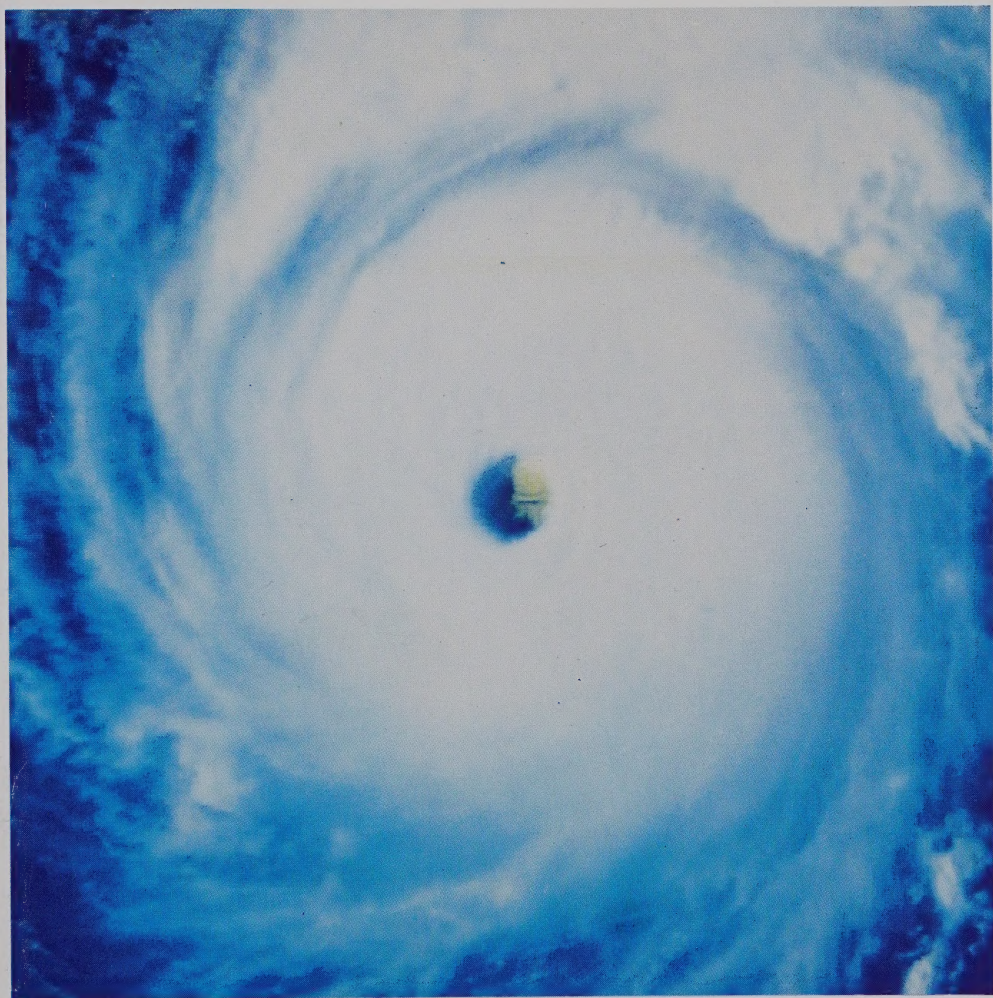


**REMOTE
IMAGING
GROUP**

31



NEWSLETTER NO.31

DECEMBER 1992



DECEMBER 1992

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Front Cover: Hurricane Andrew as seen from NOAA HRPT. Image supplied by David Cawley.

Inside Front Cover: PDUS image of British Isles by the Editor.

Centre Pages: Pictures supplied by Peter Wakelin. See Text.

Opposite: Images of Hurricane Andrew.

1) NOAA APT visual supplied by David Watson transferred from the SPAN network from the NASA, GSFC database run by T.S. Kelso.

2) As seen live from METEOSAT 3 late afternoon of 26th August 1992. Visual image, supplied by Editor.

REMOTE IMAGING GROUP.....OFFICERS 1992

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FROM THE EDITOR'S DESK

JAMES BROWN



The need to adapt to changing circumstances is very much the lot of the remote imager. When satellite imagery was in its infancy standards were set which prevailed long enough for amateurs like ourselves to match the transmission technology with appropriate reception techniques. It was a challenge, but one which could be met by time and ingenuity. When more sophisticated transmission standards were introduced amateurs again found that with the help of the 'professionals' the world of remote-imaging was still accessible to them, and even more enjoyable. Now it looks as if we are on the verge of yet another of these upheavals, the goal posts are going to be moved again, and we had better prepare ourselves as best we can for the latest changes.

If you read Roger Belcher's authoritative article you will realise that it is highly probable that by the time you read this our VHF satellite band will have already been invaded by test transmissions from the next generation of low-earth polar orbiters. Though less potent than a nearby pager, our receivers are going to be under even greater scrutiny as to their ability to filter out unwanted adjacent signals, and it looks as if the same is shortly going to be true of the geostationary situation. It's all a far cry from the days when a new signal in the band could be almost guaranteed to be of meteorological satellite origin. But change and adapt we must, or we shall be left behind. Who knows what the Soviets will do with their limited resources, and what will the future hold for Chinese satellite technology? No doubt 1993 will have many a surprise in store for us, but to be forewarned is to at least a certain extent to be forearmed.

Whilst resisting the temptation to devote a particular edition of our magazine to specific topics, which would be detrimental to the overall readership, we intend to make sure that beginners are more specifically catered for, and to that end may we encourage readers with 'beginners experiences' etc. to contribute to our next edition - but you'll have to move fast, the pages are already filling up nicely!

One way of keeping up with events is to get together with other like-minded RIGleys, and to that end we hope to stage a new first for RIG. A residential British Remote Imaging Conference. Details are on the form enclosed, but

if the support is there then we need to act fast, so please let David Cawley have your replies within the next couple of weeks.

May I express thanks again to the contributors in this edition. Once again I received a number of items in the last week before the dead-line. Sorry lads, but the magazine is full this time, and hopefully we will be able to include these next time, including a letter from Inner Mongolia! Now that's what I call Remote Imaging!! *Seasons Greetings, James Brown.*

FOR SALE...

Tektronix T912 dual beam 10 MHz analogue storage scope in working condition. Requires slight attention hence: £100.

Twin 80 track disc drives, cased with switched mode power supply suitable for BBC etc.: £35

WREN CPM computer. Built-in amber monitor, MODEM, dual disk drives. Supports BBC basic with identical graphics chip. Comes with software and manual: £45

Ring Chris after 5pm on 0203 336233

MUIRHEAD K401-D Fax receiver suitable for weather satellite reception (See RIG No.8-10) with circuit £30

RANK XEROX Telecopier 400 part converted as RIG No.13 for weather satellite reception, spare mother board/boards, stepper motor for I.O.C. mod, copy of conversion article. £40 *Buyers inspect and collect.*

M. Levers, "Waverley", Independent Hill, Alfreton, Derbyshire DE55 7DG

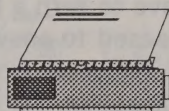
MOTHER BOARD 386SX-16 with 5MB of RAM, AMI Bios 8 slots. £120
Tel. James: 0656 782632

TIMESTEP Colour framestore for sale 5/6 years old. £200

*Philip Guy, 1 Fore Street, Exbourne, Nr. Okehampton. Devon. EX20 3RU
Tel: 083 7855517 after 6.30 p.m.*

FROM THE MAKE-UP EDITOR'S KEYBOARD

MIKE GOODALL



Well, the last issue arrived on time and we seem to have the deadline problem licked know (famous last words!). This issue enters the world of colour, and all comments will be welcome.

Many thanks to all you contributors to the RIG GIF library. Please don't think I am being impolite, but to write and thank all the contributors who have been kind enough to send in pictures would simply take too long. It really has taken off now.

Whilst I was on holiday during the first two weeks of September (when the issue landed on your doormat) we had over 150 disks to copy! Thanks must go to my son Simon (who also generates the NOAA predictions in the centre pages) for stepping into the breach and getting them all copied and in the post by the same day. He has agreed to do most of the copying for me now, which will take off some of the pressure, especially when I am working on the newsletter. We must have had around 150 members who have taken advantage of the GIF Library by now, and it seems to grow by the week.

While on the subject of the Library; we have printed the 'rules' for members wishing to have disks copied in RIG29 and RIG30, but a few people seem not to have read them! We require the disks (formatted) together with a addressed label and stamps to the correct value for return, **plus a £1.00 coin or £1.00 in stamps** to go towards the running costs (*applicable only to UK members*). Believe it or not, we still get a few members who 'forget?' to include the £1.00. (Will print a list of them in the next issue, HI).

When we started the scheme we simply asked for a few extra stamps to go towards the running costs. Some folks were more than generous, while some consistently sent nothing! We feel that the new rules of asking for £1.00 per set of disks is the fairest system. Where else could you get 6 disks of Shareware or GIF pictures copied for £1.00? I don't think we are asking too much.

As some of you may know, I run my own business from home, and although I would love to have long chats on WXFAX with the members, I

have to earn a living, and my business takes up most of my time. I will be pleased to answer queries on the GIF Library only between 2pm and 4pm in the afternoon, but I am not available during the evenings and most weekends. All other enquiries should be directed to the relevant member listed on the Helpline page, please! If you can't get the relevant member the first time, keep trying. A few members have a habit of ringing round all the others, and then the Committee in an attempt to obtain answers to their queries immediately. This can cause tension, as all the Helpline staff and Committee are recruited to help you on an unpaid, voluntary basis and do try to do their best.

Now on a brighter note, most contributors to the Newsletter have been sending in copy nice and early, and it does make such a difference to me and James; not having a mad rush in the last few days.

In order to ensure that you get your copy at the beginning of the cover date month it has been necessary to put forward the deadline dates slightly.

The future deadlines are as follows...

<i>Cover date of Issue</i>	<i>Deadline for Copy</i>
MARCH 1993	25TH JANUARY 1993
JUNE 1993	25TH APRIL 1993
SEPTEMBER 1993	25TH JULY 1993
DECEMBER 1993	25TH OCTOBER 1993

Advertisers copy will be required 7 days earlier than the deadline date, and should be sent direct to Mark Clarke. Late ads will not be included.

These dates will be rigidly adhered to and there will be **NO** exceptions.

Also, remember that Members Private Advertisements are *free*. If you have any RIG-related equipment for sale, send in the details to James.

PLEASE REMEMBER... SEND ALL COPY FOR ARTICLES, READER'S LETTERS, ETC. TO JAMES BROWN. I only deal with the RIG Gif Library on a direct basis. For all enquiries regarding GIF viewing programs and suitability for your specific computer, or general computer problems, contact the appropriate member listed on the Helpline page.

Finally, an apology to Henry and his Rally helpers... It would seem that my article in the last issue about the twin cross dipole antenna system immediately cleaned them out of stock of the said item. I understand that supplies have now been satisfactorily replenished.

CHAIRMAN'S WAFFLE

HENRY NEALE



At last the 1992 Rally season is over and no doubt the 1993 season will be upon us before we are ready for it. I, for one am not sorry. Yet again our turnover has increased beyond anyone's expectations. I feel a certain amount of guilt for working our treasurer so hard. Mark has had to tolerate another increase in turnover, VAT registration and now the taxman's eye and still look after his own job. On the other hand Farming, as some of you know, is different. I cannot stop work instantly, but with a bit of juggling, most things seem to be able to be catered for - except in the middle of harvest. If despatch of your particular order was delayed in the July to October period then my apologies. I try to keep on the ball as much as possible. We did get away for just a few days at half term but when we returned the mail had built up, and even now, I am just a little behind with the correspondence and despatch. That position will soon be rectified as soon as I can get this Waffle finished. Most items have been in stock with just a few exceptions; I feel that I can claim a 97% success rate. However, there are changes on the horizon. PcSatIII is no longer being made, but there is a replacement in PcwSatIII. This is nearly identical but certain bits are missing. The audio monitoring system has been removed. The level pots have been reduced to just one. This has resulted in a smaller redesigned board that has a gold plated edge connector! It also caters for the more recent video cards such as the ET4000 and Trident 8900 series. It is now a Microwave Modules product. The price remains the same and should not increase in the near future - further details elsewhere. ProSatII stays the same for the time being but a price rise could be on the horizon. The Proscan receivers are going up on the first of January 1993. DO NOT SAY YOU DID NOT KNOW! It will then cost £185 plus £4-00 post & Packing. The special offer that Timestep were giving on HRPT and PDUS might also be withdrawn on that date but the precise details are in Timestep's hands. Again - you are warned.

RIG has obtained a quantity of crystal filters. They are made by ITT and are type 904DM which are now obsolete. Their specification was such that we could not let them disappear. They are ± 18 Khz passband and 10.7 Mhz centre frequency. Stop band attenuation is 85 db at ± 45 Khz. At ± 60 Khz it goes up to over 100db. On their own they will not clear Pager problems. Usually Pager problems occur in the RF or mixer stages. If this

filter is used in the IF, it will not improve things. However if you are having IF problems, this could possibly alleviate them. The price will not be high, and we will include a hints and tips leaflet as soon as we can get one done. Contact me for further details.

Many of you sent us copies of the World Meteorological Office letter that had been sent to you. We quickly sent them a copy of our UK membership list and also one to Eumetsat. These organisations replied that we should be registered with our own country's DTI. We had great difficulty in finding the correct person and were shunted around many times until we finally made it. Unfortunately their response was not too brilliant and they quickly said that they could not register approx. 1000 members details simply because they hadn't the manpower. This would appear to be a continuing saga and nobody wants to accept responsibility for it. We are still pursuing the cause but without a great deal of success. Following on from that is the fact that there are now approximately 1250 members of RIG and there is still a further 2 months to go!

I don't think that you will have missed the front cover and the fact that it was in colour. Do not expect it on a regular basis. We already have had a second ink on it, so we thought that we would spoil you for the Christmas edition and go for colour. It is always difficult to forecast the result but we can but hope it all turns out well!

It has come to our attention, with regard to Advertisers in the RIG Newsletter, that occasionally the following has happened. Your orders and cheques are being processed. The cheques are then presented through the Banking system which usually takes about 5 working days. To allow some leeway it would seem reasonable to allow a further 5 days just in case something is amiss. Unfortunately your goods are not being despatched in a reasonable time - often over 4 weeks after the cheque has been passed back to your Bank. I personally feel that you should receive the goods no later than 10 working days unless you are advised of a delay. In those circumstances, the cheques should not be processed until the goods are in stock. Delays do happen, but you should not be a cheap source of capital in the meantime. If you have experienced prolonged delays please let me know about it so that I can collate details.

I mentioned in the last Newsletter that the RIG Weekend looked doubtful. This is apparently not so. Certain arrangements are being looked at and it could still be on. We need to know what sort of response we are likely to get and that is the reason for the slip in the Newsletter this time. We shall

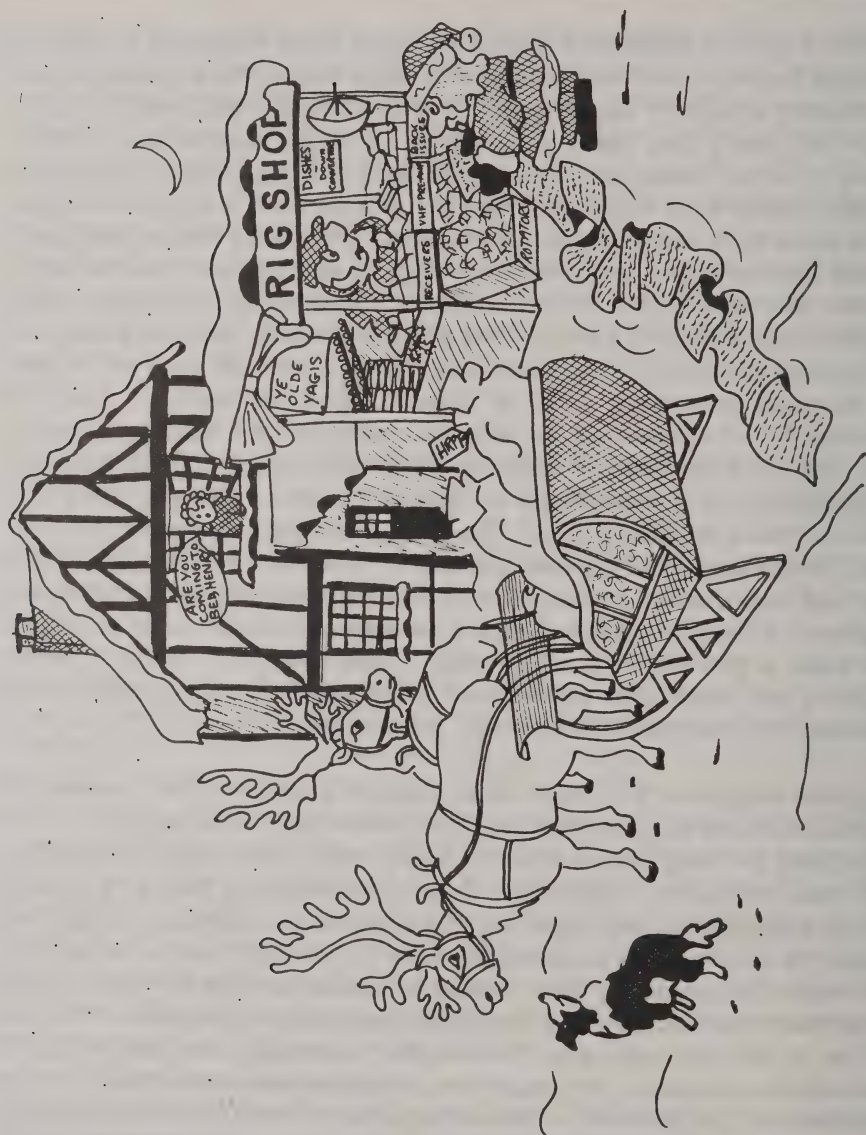
not hold you to any commitments, but returning the form will mean that you will on the mailing list for further details. Conference centres are not cheap but if you include the cost of accommodation and food it soon adds up and we were trying to make it a leisurely Weekend.

Over the August / September period we have been fortunate in that we have been having some real mushrooms from our orchard. None of your Supermarket artificially bland types - the real thing - the ones as big as plates! Cor, don't they taste good. Mind - you do have to inspect them carefully for extra biological species. The taste is indescribable - apart from excellent. These have not been selected for maximum production weight, or how quick they can start being harvested. They were natural and good. This also applies to the varieties of tomatoes that are grown commercially. Varieties and strains are now selected on evenness and colour, total production per plant and a lot of other economic traits. Give me a good old Moneymaker any day. The old varieties may not look as good as modern sorts because they have a bit of green around the stalk, or they are sometimes funny shapes and not perfectly round, but the taste is in another world. The producer will not make as much profit so the old varieties are soon discarded as uneconomical or poorly coloured. The one thing that counts for more than all this put together is of little importance to him - TASTE. When you are just growing a few for your own use, the economics are of little importance. The problem is that the old varieties are becoming increasingly difficult to obtain. If you do manage to obtain some of the old sorts, keep a few for next years seed. Unfortunately in today's world, economics are sometimes the difference between making a profit or not, and hence the downfall of a lot of the old varieties.

It has been suggested that RIG should produce a review of all the different 137 Mhz receivers that are now available to members. This has been noted and is being actively pursued, but it might take a little time. Watch this space. Also the word "Newsletter" might be omitted in future. It is more than just a Newsletter and might become a journal or something similar - we are open to constructive suggestions. Well if, I haven't run on to another page I might just get in my Best Wishes for Christmas and the New Year to you all from Thornlea, and no doubt the rest of the Committee. RIG will soon be in its 9th year and I'm another one older and feel it! Don't overindulge yourselves at the end of the month and remember that when its AGM time we can do with a few extra faces on the Committee. Do Not Forget To Renew Your Membership or you won't be getting the next "Journal"!

Best Wishes and Seasons Greetings, Henry.

Merry Christmas and a Happy New Year
to all our readers



"Look, Father Christmas doesn't make mistakes! I need 12 PDUIS systems, 200 downconverters, 56 dishes, 28 antennae, 3 miles of UR67, 150..."

from the Officers and Committee

INFO...

PCwSATIII

Microwave Modules has been acquired and relocated in Bury St. Edmunds. They have also secured the rights to Timestep's PCsatIII. To avoid legal conflicts with a similarly named product in the U.S.A., it is being marketed as PCwSATIII. The board is similar to, but not identical to, the Timestep board. The receiver channel switching and audio amplifier have been omitted enabling the price to be held for the foreseeable future.

They have added the ET4000 video driver as well as the new Paradise card (1 Meg.) giving real-time reception at 800 x 600 x 64 on these cards. Viewing the saved images at up to 1024 x 768 x 256 is also possible. All Polar satellites are saved in full resolution regardless of video card/mode. The 100 frame Animation has been retained.

File formats are identical, and a new easy installation program is included. The system will run on XT's upward. However, software is supplied on 1.2Mb disks as standard, but other formats are available on request. PCwSAT III will be advertised World-wide and will be available from selected distributors. All orders and enquiries must go directly to an Authorised Distributor. Needless to say, RIG is the first one! The Retail price is £99.95 inc. VAT, but RIG Members can purchase it for only £49.95 inc. VAT, but not carriage. The total price including VAT and Carriage will be £52.00. See RIGSHOP page.

FOR SALE...

Two Loop Yagis (need reflectors) £4.00
Gould OS3000 40 Mhz dual trace oscilloscope £90.00
Hewlett Packard 545A logic probe £20.00
Hewlett Packard 546A logic pulser £15.00
1.2m glass-fibre dish, substantial tripod AZ/EL adjustment,
1700mHz feed £60.00
Telecopier 400, two boxes of paper £12.00

*Mr. C. Scrase St Julitta, Gables Rd., WILLAND, Cullompton, Devon.
Tel: 0884 32388*

CREDIT CARDS ACCEPTED

Following negotiations with Barclays Merchant Services, the group is now able to accept any of the following credit cards as listed below:

VISA / MASTERCARD / ACCESS / EUROCARD

However, to provide this service we will be levying a 3% surcharge on all goods and services. This is the charge that the bank charges us.

ie: Rig VHF Preamp at £16.00 + 3% (48p)
total credit card charge = £16.48

The service will only be available by MAILORDER from the Treasurer, Mark Clarke and at RALLIES, please do not telephone.

To order, please write stating the following:

- a) Item you wish to purchase
- b) Your type of card (Access/Visa)
- c) Card No.
- d) Expiry Date

All purchases will be authorised before goods are despatched.

Mark Clarke, Treasurer.

FOR SALE...

Framestore, boxed £175.00
Microwave Modules Downconverter £45.00
Microwave Modules Preamp 1691MHz £30.00
90cm Dish with Feedhorn and mount £35.00
Daiwa Rotator, with Top Bearing and Control Box £75.00

*Contact... Chris Shaw, G6EUI
6 Radegund Rd, Cambridge, CB1 3RL Tel: (0223) 240275*

HIGH CAPACITY FRAMESTORES

David Woods

Food for thought in high capacity framestores.

In recent years, there have been indications of a new framestore coming out of one of the well known weather satellite companies, but nothing ever appeared. There was even a sort of preview of the gear in RIG 26. As this framestore's unlikely designer, I have decided it's time to let members know of its progress as it is now stalled in the pre-production stage and, unfortunately, will not now make it to the marketplace. I apologise to those who might have waited, but my knowledge in electronics does not extend to PCB and production design.

However, I present here the details of its design in the hope that others may find the ideas within useful. The project as presented forms the framestore core of a wider system. It interfaces with a conventional decoder along the lines of the classic YU3 design, and it outputs to a DAC (perhaps also along YU3 lines). The unit provides suitable TV sync and blanking signals to allow a composite video signal to be produced.

The design is based on my framestore described rather imperfectly in RIG 20 and the vital change is the use of dynamic memory instead of static memory. The specifications of the new unit are as follows:-

1. 8 images at 1024 x 1024 or 4 images at 1024 x 2048 pixels. 8 bits per pixel.
2. Random selection of images or cycling of consecutive images.
3. Uses TV interlace to allow 575 lines of picture at any one time.
4. Zoom between x1/2 and x6.
5. Full scroll and flip functions.
6. The possibility of having 2048 x 2048 capacity for HRPT.

I recommend you read my original article (excuse mistakes) for a definition of the concepts involved in my designs.

When compared to a static RAM framestore, the use of dynamic RAM has two major consequences when used as the memory core.

1. Rather than having one large address bus to memory which addresses each pixel uniquely, the row (field) address and the column (line) address

must be sent to memory independently on a single narrow bus via some form of multiplexing.

2. Provision must be made for refreshing memory and, with the DRAM module intended for this project, this task must be completely executed within 8 milliseconds.

DRAM has a number of advantages over static RAM.

1. Low cost per bit. It is far cheaper.
2. Can work faster within a single row.
3. Small size. DRAM allows much larger arrays to be achieved.

I wanted to use 1 Megabyte memory modules (SIMMs), Texas Instruments type TM027GAL8 or equivalent which have a 'static column decode' feature which make them particularly suitable for the framestore application when compared to conventional DRAM devices. However the prototype successfully used 'page' type DRAM (TM024GAL8 or equivalent)

When addressing conventional dynamic RAM, the row address is sent to the chip. It is latched in by RAS and then the column address is sent. This is latched into the chip by CAS.

Page Mode.

With normal **page mode** devices, a row can be addressed and latched, and while holding RAS low, subsequent bits within that row can be accessed by latching the column address on a CAS command each time the column address is changed without having to present the row address again.

Static Column Decode Mode.

Devices with **static column decode mode** operate in a similar fashion except that having selected a row with RAS, CAS does not then have to be repeatedly strobed to access bits within that row. Instead CAS is held low and bits are accessed within the row simply by changing the column address. The memory thus acts as static RAM within a single row.

Memory configuration.

Using a 1 Megabyte module, we have an 1024 x 1024 array of bytes which can represent a similar sized array of pixels. In the satellite framestore, this would hold the 800 x 800 pixel arrangement of a high quality Meteosat image. It can also accommodate the dual image format of the NOAA series with only a slight loss of either image. Also the 1200 pixels per line format of Soviet satellites is easily handled.

Since the fastest access time from DRAM is achieved from within a single row, it is intended that each row of memory will carry a single line of picture so that having selected a row, data for a line can be read out at high speed onto a TV screen.

However, 1024 lines of memory is enough for only about 8.5 minutes of a NOAA pass which can last for nearly twice this period. Rather than rearrange the addressing of a module to be 512×2048 , it is perhaps better simply to add another module, have 1024×2048 and so accommodate a Soviet satellite pass. This raises the idea of having a number of modules within the system and paging them as required, perhaps sequentially to produce an array of $1024 \times (n \times 1024)$ pixels where n is the number of available modules, or they could be randomly paged under user or electronic control perhaps to give storage of a previous pass or even a Meteosat animation.

Controlling DRAM.

Static memory requires the following control signals:

WE Write enable
CS Chip select
OE Output enable*

Address Full width, defining a single location within memory.

Dynamic memory has different requirements:

WE Write enable
RAS Row address strobe
CAS Column address strobe (which acts in a similar fashion to
 Chip Select).

Address Narrow, defining either a row or column.

With DRAM, it is necessary to use external logic to feed the appropriate addresses and their associated control signals to memory at the correct time.

Within the framestore, the order in which various events occur is heavily influenced by the 625 line TV pulse system. All TV rate pulses are provided by a single chip, IC23, called a synchronising pulse generator (SPG). The active picture period of a TV line within the UK TV system is $51.5 \mu\text{s}$. A row address is strobed in at the start of a line, then the column addresses are sent, one after the other, retrieving data from memory to form a line of picture on the screen. If static column decode memory is unavailable, a CAS strobe signal is present on the board for the active line duration, and this can be selected using an on board jumper.

Once the active period is finished, we enter a period known as blanking which lasts 12.5s and is defined as the part of the TV signal during which the picture information is suppressed. Blanking occurs every 64ms and is placed around the sync pulses. It is also continuous around the field sync pulse to define the top and bottom edge of the picture. The blanking waveform (CB composite blanking) should be used to make the output video signal black during blanking so that syncs can be added. It is within blanking that most of the memory control is carried out. The operations that occur here are of three distinct types.

1. The Write Cycle. At the commencement of blanking, the **write field address** is sent from the **write field counter** (IC4, 5 & 6). RAS is then strobed. The **write line address** is then presented from the **write line counter** (IC1, 2 & 3) and both CAS and WE are strobed. WE arrives at the DRAM slightly earlier than CAS as it passes through fewer gates. This causes DRAM to enter its early write cycle which stops any read function to take place. If WE were late then the DATA OUT pins would clash with the DATA IN pins as these are connected together within the SIMM. If the data from the **analogue to digital converter** is valid it is written into memory, otherwise WE is inhibited by BUSY from the ADC, and CAS alone is strobed having no effect but to do a read cycle.

2. The Refresh Cycles. The refresh cycles use the CAS before RAS system and consist of holding CAS low, then repeatedly strobing RAS, refreshing entire rows of memory at an internally generated row address on each RAS pulse. The internal row counter within the memory module keeps track of where it was last, between bursts of refreshing.

3. Setting up for a Read Operation. With the end of blanking approaching, the refresh cycles end and the **read field address** for the start of the next line is sent to memory from the **read field counter** (IC10, 11 & 12). It is latched in by bringing and holding RAS low. This prepares memory for reading data out to the TV system via a **digital to analogue converter**. Once blanking finishes, the **read line address** is sent as the column address from the **read line counter** (IC7, 8 & 9). If conventional **page mode** DRAM is used, CAS will be strobed once each time the address changes as the line is read out. With **static column decode** memory, CAS is held low and only the column addresses are changed.

DRAM Control signal generation.

As you may gather from above, the control signals for the DRAM and address multiplexing are quite complex and require precise timing. To

accomplish this, the eight data outputs from a small PROM are used as control signals. A counter drives the address input of the PROM.

The PROM consists of two DM74S288 devices, IC38 & 39 and the counter is made from two 74HC191 4-bit counters cascaded together. Before blanking begins, the counter output is held at zero by the output of a flip-flop holding the LOAD input of the counter low. Just after blanking commences, a pulse from Line Drive (LD) sets the FF and the LOAD on the counter is released allowing it to count up, addressing consecutive bytes of the PROM. One of the PROM's outputs provides a pulse to reset the FF, inhibiting the count and resetting the counter to zero. The data within the PROM is arranged such that each output changes according to the requirements of a particular control signal.

The output from this flip-flop is called MC (Memory Control). It is similar to CB but is slightly later and unlike CB, does not change during the field sync pulse.

The counter is clocked fast enough to allow sufficient refresh cycles per line so that the entire DRAM array will be refreshed within 8 milliseconds. I calculate that at least 5 refresh cycles must be executed per line to realise this. A clock rate of 5MHz will allow 60 bytes to be addressed within 12.5s which gives 24 full refresh cycles per blanking period, a write cycle and the beginning of a read cycle. The access time of the PROM must therefore be made fast enough to ensure that the data within it can be read at this clock frequency. Small PROMs with very fast access times are available and the DM74S288AN has an access time of 35ns.

The eight bits from the PROM are assigned as follows:

- Q1** Enables the write field counter's output.
- Q2** Enables the write line counter's output and enables the output of the ADC onto the data bus.
- Q3** Enables the read field counter's output.
- Q4** Row Address Strobe (RAS).
- Q5** Paged Column Address Strobe (CAS). Only fed to currently selected module for reading and writing operations.
- Q6** Omni CAS. This goes to all modules to enable the refresh operation.
- Q7** Write Enable (WE). This is gated with BUSY and inverted to execute a write cycle.
- Q8** This is set low at the end of the PROM count sequence to reset the controlling flip-flop and thus inhibiting any further counts and resetting the counter to zero.

The first byte is mostly the same as the last so that the DRAM control signals are unchanged while data is read out of a line of memory. Only Q8 changes so that the count is no longer held by anything except the flip-flop thus allowing the counter to cycle only when LD sets it.

Memory module selection.

Unlike static memory, DRAM has no 'chip select' pin, or rather, CAS is used for the same function and switching between modules is achieved by routing CAS to the required module. However, refreshing must be carried out on all modules present and this uses the CAS signal as well. Therefore the CAS signal is split into two according to function.

1. **REFRESH (OMNI) CAS.** This is distributed to all CAS inputs of each module via eight AND gates (IC29 - 30). It is generated by the control PROM and timed so that it initiates a **CAS before RAS** refresh cycle. Since it goes to all modules, it refreshes them all.

2. **R/W (PAGED) CAS.** This is the CAS signal for all read and write operations and so it goes to only one module at a time. It is distributed by a control system based around a 3-bit address bus (IC33, etc.) giving access to eight modules. It comes from one of two sources.

If static column decode DRAM is used then only the Read/Write CAS from the PROM is fed as the paged CAS signal. This is combined with MC by IC22d, an AND gate. MC is used to hold CAS low during active picture time. **Page mode** DRAM, however, requires an actively strobed CAS signal during active picture time and this is sync with the line scan clock and is derived from it.

MC and the line scan clock are combined in an OR gate, IC20c. If not required, the line scan clock input to this gate can be held at ground by means of a jumper connection. It was thought possible that a direct feed of the line scan clock would be of incorrect phase to perform the CAS function but successful results with reading out of the DRAM have shown that this is not required.

CAS paging for DRAMs.

The module selection system operates in two modes.

1. **Meteosat mode.** In this configuration, each memory module is used to store individual Meteosat frames and therefore CAS is distributed under control of push buttons, or by cycling, to each module as a separate entity.

2. NOAA mode. A NOAA pass requires two modules to store it completely, as does a Soviet Meteor pass. Therefore pairs of modules need to be treated as one and so the most significant bit of the field address plays a part in selecting the current module (taken from IC6 & 12).

Implementation.

If the number of possible modules is set at eight, then a 3-bit address bus is needed to access them. Using a small address bus has an advantage over direct selection in that a counter can be used to generate the cycling function. This counter can be made transparent so as to pass a 3-bit bus generated by a keyboard encoder.

The keyboard encoder is a device which scans a matrix of 16 push buttons and generates a 4-bit code to indicate which button was last pressed. Another output from the encoder flags the press of a button by going high and this is used to switch between direct and cycle modes. Since only eight memory modules are to be implemented, then only the three least significant output bits are used.

Direct / Cycle selection.

The directly selected 3-bit bus now generated is fed to the preset inputs of a counter. If the LOAD input to this counter is low, then the preset inputs are passed to the outputs. Otherwise the counter increments as driven by its clock input, starting with its last preset number and this clock, built around a 555, has a frequency of about 1Hz for animation.

The LOAD input to the counter is decided by the toggle output of an SR flip-flop, IC34a. This goes low by feeding its R input with the output of the encoder which signals to the flip-flop that a button has been pressed and so the preset inputs should be passed through the counter. Setting the flip-flop with a push button makes the LOAD signal go high and the counter begins to cycle.

NOAA / Meteosat selection.

If Meteosat frames are being stored then each module is addressed independently and the 3-bit address bus from the counter goes to a 3 to 8 decoder, IC31 with the LSB passed through a data selector, IC32. If NOAA passes are to be stored, the data selector changes the LSB going into the decoder from being the 3-bit bus LSB to being the eleventh bit of the field address. The other two lines of the 3-bit address bus can now only select one of four large pictures, each picture consisting of two memory modules. Selection of modules within a pair is now controlled by the field address.

Decoding and adding CAS.

The 3 to 8 decoder takes the 3-bit bus so far produced and puts a low appropriately on one of its eight outputs, assuming that the ENABLE input is low. By feeding R/W CAS to the ENABLE input, this CAS signal will be distributed (paged) to the selected memory module.

All of the decoder's outputs are each fed to AND gates, IC29 & 30, the other inputs of which are fed with REFRESH (OMNI) CAS. When RFSH CAS goes low, all the AND gate outputs go low thus combining the two CAS signals.

ADDRESS GENERATORS.

The core of the system is IC1 to 12, the address generators. There are four counters, one for each address and each consists of three, four-bit devices, the 74LS569. These are cascaded as 10 or 11 bit counters and their outputs are tri-state. During blanking, outputs from the control PROM direct which counter goes to the address bus. The read line counter is enabled by MC during active picture. The operation of the counters is as follows:-

1. **The Write Field Counter.** (IC4 - 6) This is clocked by APT line pulses and defines which line is being written into. It is reset to begin writing a fresh picture by a pulse which at present comes from a push button.
2. **The Write Line Counter.** (IC1 - 3) An APT derived 2.4kHz square wave clocks this counter and it therefore defines where, in a line, a pixel is to go. It is reset to the start of a new line by APT line pulses.
3. **The Read Field Counter.** (IC10 - 12) This is clocked by the internally generated field scan clock. It defines which lines of memory are read out as a particular TV line and it is reset by Field Drive (FD), a 50Hz TV pulse. Another counter (IC15 - 17) presets this counter, defining the line of memory read out at the start of each field. Clocking this second counter causes the picture to scroll vertically.
4. **The Read Line Counter.** (IC7 - 9) This is clocked by the internally generated line scan clock. It scans through a line of memory, reading it out to the DAC. It is reset by LD (15,625kHz). This counter is preset by IC13 & 14 which permits horizontal scrolling.

The counters are inhibited from reaching excessive counts by disabling the clocks whenever a particular high order bit goes high. As the counters are tri-state, the high order bit is only available for a short space of time during blanking. However, it is used to set a flip-flop (IC18a) and the output of that inhibits the clock. The flip-flop is reset by the same pulse which resets the counter and the clock is made available again to the counter.

Clock Generation.

A single master high frequency clock of 20MHz is generated by a crystal to drive the **read counters**, the TV Synchronising Pulse Generator (SPG) and the DRAM control PROM. Programmable dividers, IC40 and IC41, are used to generate a wide range of clock frequencies for the **read counters**.

Line Scan.

For the **line scan clock**, the 20MHz oscillator's output is divided by IC40 as follows:

$$f/1 = 20\text{MHz}$$

$$f/2 = 10\text{MHz}$$

$$f/3 = 6.67\text{MHz}$$

$$f/4 = 5\text{MHz}$$

$$f/5 = 4\text{MHz}$$

$$f/6 = 3.33\text{MHz}$$

$$f/7 = 2.86\text{MHz}$$

A 5MHz clock is generated as the master clock for the SPG and for the DRAM control PROM by dividing by four, using a 4040 ripple counter (IC42).

Field Scan.

As we are reading out lines of picture at TV rate, the **field scan clock** is based around F_h , the line rate of the UK 625 line TV system and $F_h = 15.625\text{kHz}$. Another output from IC42 ($20\text{MHz}/32$) is further divided by 10 by IC43, to give the $4F_h$ read field master clock for IC41. The divide by 2 stage (IC45) which comes after the programmable divider ensures an equal mark/space ratio. The frequencies thus generated as the **field scan clock** are:

$$f/1 = 31.25\text{kHz}$$

$$f/2 = 15.625\text{kHz}$$

$$f/3 = 10.417\text{kHz}$$

$$f/4 = 7.813\text{kHz}$$

$$f/5 = 6.25\text{kHz}$$

$$f/6 = 5.208\text{kHz}$$

$$f/7 = 4.464\text{kHz}$$

These clock frequencies of the line and field scan clocks give a magnification range of $\times 1/2$ to 6.

Zoom Selector.

Another keyboard encoder with seven push buttons generates three binary

lines which load the two presettable counters, IC40 & 41 via the three least significant inputs with the fourth bit held low. The seven buttons are designated 1 to 7 and are arranged so that a particular button will load the counters with that number. It should be noted that the zero state from the encoder is not used.

The Programmable Clock Dividers.

The counters are made to count down and are loaded by a pulse from their RCO outputs. This makes the counter cycle from the loaded value to zero and jump back to the load value. The higher this is, the longer the complete cycle lasts. This means that the input frequency of the clocks are divided by the value on the preset inputs of each counter and since this is the same for both counters, they are divided by equal factors. The field scan clock goes through an extra divide by two stage to ensure that the mark/space ratio is equal so that on higher magnifications, the clock itself can be used as the LSB of the read field address.

Using a common source for all the clock frequencies ensures that there will be a constant phase relationship between each clock signal and the TV pulses and so eliminates picture jitter which can be a problem with analogue derived clocks.

Aspect Ratio.

The aspect ratio of the picture given by these combinations of frequencies is not perfect. Using a Meteosat, whole Earth image on a normally adjusted monitor, the line scan clock needs to be 11.3MHz rather than 10MHz for a field scan frequency of 15.625kHz to give a truly circular image. The present values will give a flattened picture.

Interlace control.

In order to maintain the highest possible picture resolution on the output screen, the concept of interlace, which is built into the 625 line TV system, is employed allowing 575 different lines of picture to be displayed at once. This has one disadvantage in that isolated spots of fine detail in the vertical direction, especially interference or Meteosat coastal outlines, will exhibit flicker at 25Hz. Clean, good quality pictures however greatly benefit from interlace.

Interlace affects the read field address because during one TV field of 312.5 lines, only alternate lines of memory are read out. The missing lines are read out during the next field. IC25, 26 & 27 fulfil the different requirements for the wiring of the low magnifications which are as follows:

x1/2 To ensure that only every second line is read, the read field address LSB is held low. The second LSB is fed by RI or RI inverted, depending on

Lines in Memory	Field 1	Field 2
	1	
Not used		
		1
Not used		
	2	
Not used		
		2
Not used		
	3	
Not used		
		3
Not used		
	4	

Line addressing for x0.5 interlace

Lines in Memory	Field 1	Field 2
	1	
		1
	2	
		2
	3	
		3
	4	
		4
	5	
		5
	6	
		6
	7	

Line addressing for x1 interlace

the scan direction. RI is a 25Hz square wave from the SPG which identifies one TV field from the other. (There are 2 TV fields in a 625 line TV frame.) This means that during one TV field, every fourth line is read out and on the other field the missed line between those already read are scanned. $f_{clk}/1$ further divided by two is used to clock the read field counter and its frequency = $2F_h$.

x1. This time RI or RI inverted (depending on scan direction) goes to read field address LSB and so every second line is read out during field 1. The other lines are read out during field 2 thus providing correct interlace. The

Lines in Memory	Field 1	Field 2
	1	1
	2	2
	3	3
	4	4
	5	5
	6	6
	7	7
	8	8
	9	9
	10	10
	11	11
	12	12
	13	13

Line addressing for X2 Interlace

second LSB now reverts to the counter output. $f_{clk}/2$ further divided by two is used to clock the read field counter and its frequency = F_h .

x2 and greater. Now RI is removed as it is no longer required. The LSB is fed from the clock itself which becomes part of the address. The 2nd LSB is still fed from the appropriate counter output. The 3-bit bus generated by the zoom select push buttons is used to control the switching of the LSB and 2nd LSB by addressing two 8 input data selectors, IC26 & 27. The output of the first becomes the read field address LSB while the output of the second forms the 2nd LSB. These selectors ensure that the correct signals go to the read field address depending on the zoom magnification required.

So as to ensure proper interlace when the picture is flipped, the RI and the clock signals are inverted then this and the non-inverted versions are selected to pass on depending on whether the Up/Down input to the read field counter is high or low, i.e. whether the picture has been flipped or not.

A 4 Megabyte version!

4 Megabyte memory modules are available which are pin compatible with the 1Mbyte modules used in this design except for an extra address line on pin 19. The 11 bit wide address bus is now capable of handling 2048 x 2048 pixels per module. The chief advantage of this is that it matches the width of a line coming from NOAA HRPT systems. It should be possible to modify the existing circuit easily to accommodate such large arrays of memory. One would no longer need to join two modules together to carry a NOAA pass, simplifying part of the circuitry, as it is no longer necessary to use the eleventh bit of the field address to switch the module selector. An extra bit is added to the size of the address coming from each counter.

Development so far

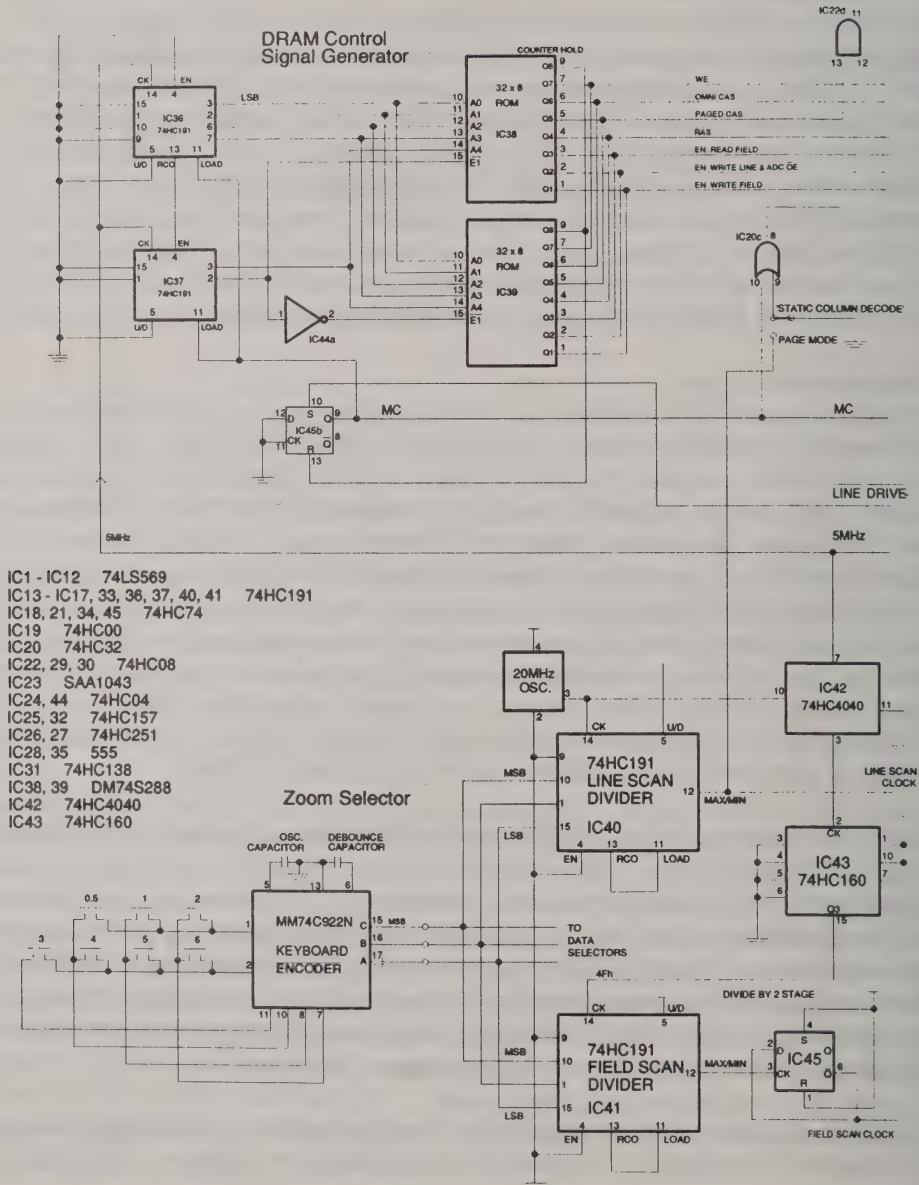
After two years of occasional work, the framestore as presented here is successfully storing pictures. There are some odd instabilities which I have not yet ironed out and my unit is proving to be mechanically unreliable which I feel may be primarily due to my construction method of Veroboard and Verowire. Remember, there are 20MHz signals floating around this board and I do not doubt that a well designed PCB will improve this greatly. The write system has a habit of not resetting the write line counter properly and so some lines in the picture are written in the wrong position. Again this may be due to poor construction allowing glitches onto the reset of other lines. Some of the zoom settings are giving frequencies which are not multiples of TV line frequency but $x1/2$, $x1$, $x2$, $x4$ and $x5$ are fine. The effect is that pixel edges become serrated or sawtooth like.

I shall be returning to my 'Mark 1' static RAM framestore which has given years of good service. I hope that the 'Mark 2' project described above turns out to be of interest to some members and if anyone wishes to take up the challenge of building it, I would be more than glad to provide advice and assistance. Copies of both designs are available from me if required. Send a large SAE for paper copies. The write-ups are available to PC users by sending a disk. Acorn computer users can have articles and latest drawings in !Draw format, also by sending a disk.

[David has produced some excellent circuits; a sample is reproduced on the next page. His address: 157 Rannoch Drive, Bearsden, Glasgow, G61 2BQ.]

DRAM Framestore. Drawing 1.

© D. Woods. 1992.



CONSTRUCTING EGGBEATERS!

Simon Lewis, GM4PLM

Beat well for 3 mins then cook at Gas Mark 6.....!

No! Sorry this isn't an article on the latest gastronomic delight, but actually about an amazing antenna discovery. Interested? Read on.....

Eggbeaters???

Sometime ago in the AMSAT-UK magazine, Oscar News, I spotted an a photograph of an American amateur holding a strange looking device. The caption said that the photo showed the new 'Eggbeater' antenna. A few months later I spotted the same antennas on display at the London Amateur Radio Show. I spoke to the staff on the stand and they told me a little more about this odd looking device.

The antenna consists of two full wave loops of narrow gauge wire, vertically opposed by 90 degrees to each other, hence the 'eggbeater' comparison. The loops are mounted on a strengthener. A small junction box at the base of the antenna contains a quarter wave phasing harness. A line diagram of the antenna is shown at Fig 1. The antennas produce a dual radiation pattern. At low angles the antennas radiate in an omni-directional pattern using horizontal polarisation, whilst at higher angles and overhead the antennas produce a more vertical radiation pattern but with a Right Hand Circular polarisation pattern. These unique patterns make the antennas very suitable for Low Earth Orbit satellites as the user does not have to change antennas during the pass to compensate for changing azimuth and elevation angles. The RHC polarisation also negates the fading due to changing attitudes between the groundstation and the satellite.

Great! Sounds like an antenna for all seasons, Yeh, but what a price! The VHF version covers 136-150 Mhz and costs nearly £100. The UHF version covers 300-500 Mhz and comes in at a similar price. So how does the average amateur produce a decent replica?

Constructing your own Eggbeater

The answer is quite easily! Using only doweling, small gauge wire and a plastic box the average amateur can produce a very workable homebrew version of the eggbeater. I started by noting the size of the loop of the commercial version, which is 74cms across the loop ie Diameter. Using simple maths I calculated I would require 2.26 metres of narrow gauge wire for each loop. You can use almost any wire but it should be thick enough to be self supporting. I used PVC covered fencing wire, about 2-3mm dia.

The support rod was made from 18mm wood doweling. This was cut to about 1 metre in length, this gave me a small section underneath the antenna to produce a mount for the antenna.

On the top of the doweling I screwed a small plastic box. The box measures about 48mm x 48mm x 30mm. In each face I drilled a hole big enough to pass the wire for the loops through. I then marked through these holes onto the dowel and drilled some small holes a few mm deep to suit the wire diameter. The wire is then passed through the holes in the box faces and pushed into the holes in the dowel. This whole assembly is then turned upside down and the box filled with fibre glass resin. You could use another type of fibre glass filler, such as P40 etc. This is then left to set for 24 hrs.

Whilst the loop assembly is curing you can get on and construct the phasing harness housing. This is constructed from an ABS box. A hole should be drilled at each end of the box to suit the doweling. At one end you should mark out 4 holes equal to each other. Four mounts are then required to hold the bottom of the wire loops. I constructed these from 8mm bolts. These are held in a vice and a small 2 or 3 mm hole is drilled through them. Another hole is also required in the box to suit your coax connector; the position of this is un-important and the constructor can decide where to place this.

The phasing harness is constructed from a quarter wavelength of 90 ohm coax. The exact length will depend on whether you use foam or polythene dielectric coax. The formula to calculate the correct electrical length is:
Length = velocity factor x 1/4 free space wavelength. The velocity factor for foam filled coax is usually 0.81, and 0.66 for polythene dielectric coax. Once the loop assembly has cured it can then be mated to the phasing harness box. The box is slid up the pole with the loop fasteners upright. The box is then moved until it is 74cms from the loop assembly. This fixes the loop size. The loops are then secured using nuts and bolts. The loops can then be squashed or expanded to produce a nice circular shape. Time taken over this will ensure an even radiation pattern with no lumps or bumps in it. The box can then be secured in place with Epoxy Resin. That concludes the manufacture of the loops. The constructor has simply then to cut a length of coax to the measurements shown and connect as shown in the diagram.

Testing

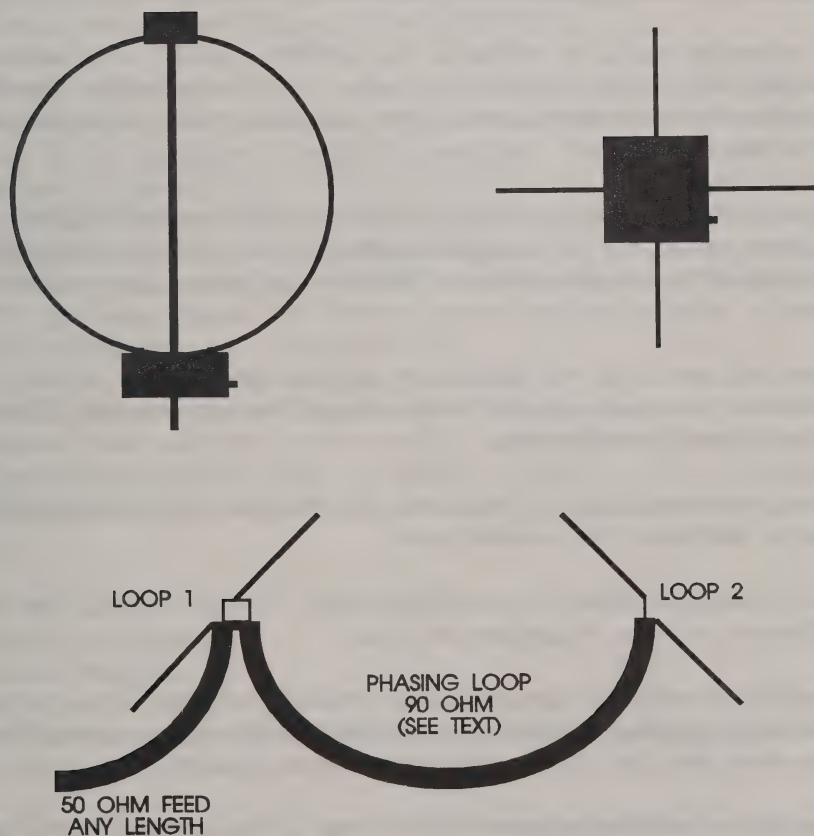
To test the antenna you should use a known signal source such as a repeater, this will not move around whilst you are trying to set up your new

antenna! The loops should be rotated slowly and the signal strength noted. There should be no deep fades apparent. If there are try reversing ONE dipole connection. If there is still fading apparent, check your phasing harness lengths. You are using the right coax aren't you!

Conclusions

The Eggbeater antennas produce excellent results for LEO satellites. They are simple to build and align and are very inexpensive to construct. Build one and try it! You WILL be amazed!

Fig. 1



WEATHER SATELLITE DECODING SOFTWARE

S. L. Hurcombe

Introduction

The program(s) that I am going to describe allows an IBM PC to receive and display NOAA weather satellite pictures without the use of a hardware decoder. The only requirement is an A/D (Analogue to Digital) converter. The system has successfully decoded pictures, from audio tape, from the NOAA satellites.

The format of the signal sent from NOAA, and other satellites is well known. The main RF signal is FM modulated with a 2400Hz audio tone, the amplitude of which represents the white level of each pixel.

The software works by digitising this 2400Hz 'carrier' sine wave and extracting the pixel information in software. It is the amplitude of the signal, and hence the height of the peaks of the sine wave, that encodes the white level of the pixels.

The program that I have written continuously digitises the 2400Hz wave and takes a snapshot of the signal amplitude at the peaks, and troughs, of the signal. It then displays these amplitude variations as grey scales on the screen.

As we will see, it is the number of digitised samples per second, that determines the overall quality of the images that you receive. There are several factors that affect this,

1. The processing speed of the computer - this restricts the time between samples, and hence the sampling rate.
2. The conversion speed of the A/D converter - if this is too long, then it too will limit the number of samples per cycle.
3. The rate at which you can plot pixels - this is determined by the combined speed of the graphics card, and the graphics package you are using. If either is too slow, then this will slow down the whole system.
4. The rate at which you can store the data - it has proved impractical to store the images straight to harddisk, however it is possible to store the data in memory, saving it to disk when the screen is full. A DOS extender

was used, to get 16MByte available to DOS, but this imposed a 20% speed overhead, for the same reason that for Windows 3.0 in enhanced mode is slower than standard mode, and slows down the system too much.

Although with a machine faster than a 386SX 16MHz this would be less of a problem. The DOS 640K memory limit also limits the number of grey scales that you can store. Currently I can achieve 16 grey scales (4 bits per pixel, 2 pixels per byte) with ease.

Software requirements

The software was written in C++, Zortech C++ 3.00 to be exact, although plain C should be just as fast, if not as easy. A good, fast, graphics library is also an essential part of the system, if you want to view the pictures as they come in off the satellite, or off audio tape. Turbo Pascal has been used successfully on a 20MHz 80386DX.

Hardware requirements

The speed of the A/D converter, and more importantly the computer, is critical to the operation of real-time software. The system that I used consists of a Reeves 386SX 16Mhz VGA colour PC and a home built 8bit A/D converter with a 10uS conversion time (the board design was from Practical Electronics). Any 8bit A/D converter with at least a 10uSecond conversion time, coupled with any PC that is as fast as, or faster than, a 386SX (for example a 286 20Mhz should also be suitable) should be capable of decoding and storing pictures.

Although I have not tried it, it should be possible to use a much slower computer if you record the satellite passes onto audio tape, then slow down the tape playback speed when you decode the pictures. This will decrease the frequency of the audio carrier tone and give you more samples per cycle.

Processing the Signal

Decoding the pixel

The technique adopted for decoding the pixel data is quite straight forward, and can be reduced to two main procedures,

1. Extract the absolute values for the maximum and minimum peaks of one sine wave cycle by digitising it as fast as possible, while checking for the maximum and minima.

2. Take the difference between these two values, convert it into a *grey scale value*, plot it on the screen, and then store it in memory for saving to disk at the end of a screen.

An important point about this way of measuring the pixel values is the subtraction process itself. Taking the difference between the maximum and minimum values ensures that any DC offset, caused by tape wow, is eliminated.

The first sequence of code, that retrieves the maximum and minima, is outlined pseudo-code below,

Set *CurrentMaximum* to 0

Read in an 8bit value from the A/D converter.

Is this value greater than the *CurrentMaximum*?

If it is, then this means that the signal is still rising towards the peak of the sine wave, so mark this value as the new (possible) sine wave peak.

CurrentMaximum = current sample

If it is not, then this means that the signal has started to fall away from the peak of the sine wave, and is starting on the downwards slope, towards the minima. This also means that the *CurrentMaximum* value is the sample taken at the top of the sine wave for this cycle, and should be passed on to the second part of the code for subtraction.

Go back to the start of this loop for another sample, but this time reverse the logic since we are looking for a fall towards a minimum.

The C++ extract below illustrates the techniques,

```
void DecodeC::ReadImage (void)
{
    Max = 0; // Because of the way that I have defined these functions, each of these
            // variables is available to all members (functions) of DecodeC
    Running = true;

    while (Running)
    {
        IO.FastIn(); // Read from A/D
        if (Rising) // If looking for a maximum...
        {
            // If new value > last maximum then 'store' it as a new maximum
            if (IO.Val > Max)
                Max = IO.Val;
            // Otherwise if it has fallen sufficiently far to not be noise the last
            // maximum must be a peak so mark it
        }
        else
        {
            if ((Max - IO.Val) > DELTAVALUE)
            {
                Mark(); // Max detected, save it
            }
        }
    }
}
```

```

        Max = 255;
        Rising = false; // Now look for minimum
    }
}
else // Looking for a minimum
{
    if (IO.Val < Max)
        Max = IO.Val;
    else
    {
        if ((IO.Val - Max) > DELTAVALUE)
        {
            Mark(); // Min detected, save it
            Max = 0;
            Rising = true; // Max again
        }
    }
}
}
}
}

```

When we have taken two successive values, we know that we must have read in both a maximum and a minimum peak. We can now subtract one from the other, giving an absolute measurement of the pixel's colour. Using this value in conjunction with a lookup table (for speed) it can be converted to grey a scale. The pixel can then be displaying and stored.

The C++ extract below shows this process, although not in detail,

```

void DecodeC::Mark (void) // Calculate and store pixels
{
    if (Max > Prev)
        Value = Max - Prev; // Calc difference between Maximum and Minimum
    else
        Value = Prev - Max;
    Prev = Max;

    DotCount++;

    // This is where we count samples, in doing so we split the workload over 4
    // samples. Remember that we can only display one in four samples with VGA displays
    // (600 pixels/line, two images side by side.
    // First sample - Draw and Store the dot           Second sample - Check Trigger
    // Third sample - Set Colour, Move and Store the dot Fourth sample - Check Trigger
    // You can see that 50% of the pixels are sampled and saved (half of these are
    // displayed too) and the remaining 50% are used for triggering purposes then
    // discarded.
    if (On)
    {
        if (On2) // First sample
        {
            Dot.draw(); // Plot the pixel
                        // Store the pixel in a one-line array
                        // (a new line is malloc'd when this one is full)
            LineData[Pixel] = Lookup[Value];
        }
    }
}

```

```

        On2 = false;
        On = false;
    }
    else // Third sample
    {
        // Set the colour for the dot using a lookup table
        Dot.setforeg (Lookup[Value]);
        // Move the dot to the next position
        Dot.setx (++Col);
        // Store the dot, this time in MS Nibble
        LineData[Pixel] = (Lookup[Value] << 4) | LineData[Pixel];
        Pixel++;
        On2 = true;
    }
}
else
{
    // Line synchronisation code goes in here
}
}

```

The pixels are stored in memory, 2 pixels per byte (16 grey scale). This gives 1200 samples per line. By taking alternate pixels and plotting them directly onto the screen gives you the two images (infrared and normal) side by side on a 640x480 VGA screen (I use VGA mode 12, 640x408 in 16 colours). Once saved to disk, all 1200 pixels per line, the two images can be displayed individually at a later date, with 600 pixels per image.

Allocating time to each process

With a computer about as fast as a 80386SX 16MHz you will need to think carefully about how you allocate the available processor time between pixels. The steps that need to be taken can be split into two types, items that can be done on alternate pixels and items that can be done on any pixel. For example you would display the first pixel (and save its value temporarily) and save it with the second pixel (remember each pixel is 4 bits wide). This means that the processor has more idle time during the second pixel as it has no screen plotting to do. The steps that are required to capture an image reliably are as follows,

1. Draw the pixels.
2. Assemble first and second pixel nibbles into a byte and store the byte.
3. Check for a valid line sync pulse, and for a missed pulse.
4. Check for a screen full of data, (scrolling the screen is impractical due to a lack of speed).
5. At the end of a line, check the keyboard. This enables you to stop the sampling and save the data.

By juggling these jobs around you can even out the processor loading. If you

get it wrong, then you will see white bars appear in the image. This is caused by one pixel taking too long to process, and causes the software to miss the next peak of the sine wave, leading to an erroneous grey scale value. You can see my attempt at a solution in the software listings.

Line synchronisation

This software solution relies on capturing every peak and trough of the carrier wave and measuring the height between each successive peak. This is an important point, because any satellite noise spikes that become injected into the carrier, will add to the number of effective peaks that the software reads (the DELTAVALUE in the software extract earlier helps to eliminate noise spikes on the tops of the carrier wave). This increases the number of pixels per line that the software counts, and hence makes each line longer than it should be. This causes the image to drift slowly to the right.

Conversely, any peaks that are missed (peak black pixels are difficult to detect because of their low amplitude) will cause the image to drift to the left. This problem is nowhere near as severe as the satellite noise, however. To get around this problem some form of line synchronisation is essential. This should correct any image drift that WILL occur without it.

A few hints to the solution, the line sync pulses consist of fixed sequences of peak white and peak black pixels. You can also predict where they will occur (because of the fixed line length) once you have detected at least one sync bar. This fact allows you to ignore obviously bad line sync detects and improves acquisition with noisy signals.

Calibrating grey scales

Since we cannot rely on the amplitude of the signal to be consistent between satellite passes, we cannot apply rigid grey scale values to fixed pixel values. A low amplitude signal may only fill a narrow range of a fixed grey scale system, thereby losing picture dynamic range information. The solution adopted with the current software is to stretch the available colours (greys) to fit the available dynamic range of pixel values.

This is achieved by reading in at least one line of data and capturing the maximum and minimum pixel values (the peak white and peak black readings respectively). We can then spread the 16 grey levels evenly between these values, assuming that they are representative of the whole image. Once we have determined the steps in the grey scale they are put into a lookup table, or in C terms a character array, 256 bytes in size. The index into this table is the pixel value read off the tape (or satellite), and the

output is the grey value of the pixel that is to be plotted on the screen. See the source code.

Any values outside the range of read values (the signal may vary in volume from the calibration line read in at the start) are filled with peak black or peak white greys. This hides any excursions outside the reference peak white and peak blacks, that may be caused by noise spikes and deep white cloud formations.

Using a SCOPE

I have found that writing a program to display the signal from the A/D as though it was being displayed on an oscilloscope, is a very good way of checking the hardware, and optimising your A/D read routines. It is also the best way to set the volume level without the use of a normal scope, once set you can then load the weather satellite software.

The future

This system has proved to be surprisingly effective and the next challenge is to try for some Meteosat images. I am in the fortunate position of working at BT's Satellite Earth Station in Herefordshire, and it just so happens that one of the 3m dishes is currently unused. The 32m dishes that we also use for international telephony, are a little impractical for Meteosat use, however. The 3m dish should prove to be ideal for experimenting with, although getting hold of a cheap block down converter is proving to be a bit of a problem.

HRPT should also prove to be relatively easy to decode in software, as the data rate, once converted to 8bit parallel using a shift register, is well within the capabilities of a PC. The use of a 64 byte FIFO should also simplify the hardware no end.

The moral of the article is that with every solution involving computers, there is a trade off between using a mainly hardware solution, and a mainly software solution. With the ever increasing power of today's machines we can move further and further towards software solutions than was ever thought possible a few years ago.

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MEMBERSHIP REPORT AND 1992 MEMBERSHIP SURVEY

Ray Godden

As of October 1st the Total RIG membership stood at 1223.

This represents a notable increase, as the total at the end of 1991 was 1105. Bearing in mind the apparent waning of interest in other electronics-related hobbies (e.g. amateur radio), and the current pressure on personal finances, it is an encouraging performance by The Group.

The number can be analysed as follows...

Renewing members	930 (76%) (84% in '91)
New Members	293 (24%)
1991 members not renewing	123 (10%)

A high proportion are impressively loyal. Currently the number of new members is significant, and will rise further by the end of the year.

Overseas members	133 (11%)
Radio-amateur members	742 (61%)
Involved in education	123 (10%)

The percentage of overseas members compared to 1991 shows a small increase. Members by country...

Sweden	16	France	2
USA	15	Mauritius	2
Australia	13	Oman	2
Eire	11	South Africa	2
Italy	11	West Indies	2
Germany	10	Zimbabwe	2
Holland	10	Falkland Is.	1
New Zealand	6	Kenya	1
Switzerland	5	Russia	1
Belgium	4	Saudi Arabia	1
Spain	4	Sri Lanka	1
Malta	3	Luxembourg	1
Norway	3	Western Samoa	1
Canada	2	Yugoslavia	1

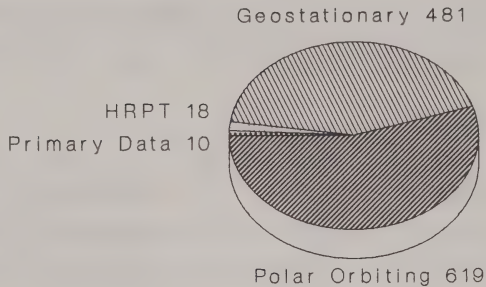
The location of UK members by county is shown on the map.

UK Membership Distribution - Number of Members per County.

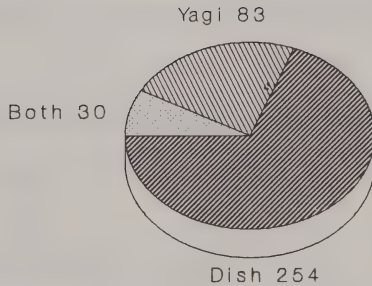


Approximately 500 questionnaires from 45% of the membership were returned partially or completely filled in. This is a large enough sample to be statistically reliable if it is representative of the whole, but this may not be the case as, for instance, new members are not included. Where no new information was received old data has been used. Nethertheless, the data is still a good guide to RIG members' activities. In view of the above the summaries are presented as number only, not percentages.

Weather Satellite data
being received
by members:



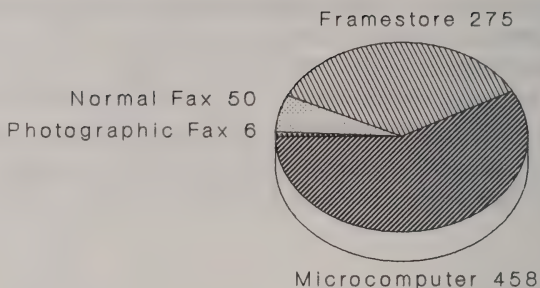
Geostationery antennas
being used by members:



Downconverters used by members:

Dartcom	147	Maplin	16
Timestep	52	VHF Communications	9
Microwave Mod.	45	Feedback	4
Homebrew	26	ICS	2
Martelec	22	Others	5
LMW	21		

Viewing methods used by members:



Compared to 1991 there is a large swing towards computer display as compared to framestores.

Types of computers used:

IBM or clone	354	Commodore	10
BBC	148	Amstrad	6
Archimedes	73	Mac	5
Amiga	62	Electron	1
Atari	33	DEC Vax	1
Sinclair	18	Others	8
Nimbus	13		

The IBM compatible is becoming increasingly dominant.

Manufacturers of hardware/software used:

Timestep	234	Microwave Mod.	59
Dartcom	219	ICS	36
Martelec	101	LMW	28
Maplin	83	Comar	9
Spacotech	77	Quorum	3
Homebrew	62	Others	53

Interference was experienced by 313 members. Compared to their last report it has: Increased 57 Stayed the same 235 Reduced 21

This is about the same conditions as last year, which is disappointing as one might expect an improvement due to better RX performance - possibly this has been outweighed by the increasing density of paging transmitters.

In reply to the questions relating to what you would prefer to see in the RIG magazine...

Constructional articles	less - 12	same - 123	more - 212
Members' letters	less - 16	same - 257	more - 064
Members' experiences	less - 11	same - 192	more - 145
Reviews, Hard/Software	less - 16	same - 128	more - 204

[It would seem that we have it almost right, with just a few more Reviews and Constructional articles being required, Mike]

The features that are made use of by members...

Keplers - 191 Reference Orbits - 96 Noaa Predictions - 199

Members with Modems - 124 without - 137

Those who will use the RIG BBS - 93 will not - 88 may use - 35

[Remember.... If you don't fill in the Survey Form when renewing we will never know what you are doing, or what is needed in the Newsletter.]

Membership Secretary's Comments...

When I took the position as RIG Membership Secretary I was none too sure of what might be involved. There was always the fear of fouling up the membership database with untold consequences or being overwhelmed and getting far behind with the work. Happily due to a smooth handover from the previous incumbent, Des Watson, and great cooperation from The Chairman and other committee members, there have been no great traumas. All the members with whom I have dealt, by 'phone or by correspondence, have been friendly and understanding.

The 'Rig-Sub' Post Office Box is to avoid the problems of large quantities of post arriving at the house at times when we might be away. Apart from one or two mix-ups with another box with a similar name, that has worked very well. Incidentally the Post Office staff thought that we were involved with oil operations in the North Sea! (Think about it).

As the middle of the year approached I was concerned that a high proportion of members had not renewed. Therefore about 400 reminder cards were sent with a gratifying response as you can see from the report above. A number of members complained, with some justification, at the lack of prominence of the form in the December issue. Therefore it has been made much harder to miss this time. The magazine is now being published regularly on time - if you do not want to receive it late - or inconceivably not at all - detach the form, fill it up and return it me at the P.O.Box. ***Do it now!***

AMATEUR REMOTE IMAGING

Simon Lewis, GM4PLM

I thought I would start this issue with a quick review of what has been happening in the amateur remote imaging world.

Kitsat

KITSAT - the Korean Advanced Institute of Technology (KAIST) satellite was successfully launched by Ariane rocket on the 22nd August. This satellite was built at the University of Surrey by KAIST students under the guidance of UOSAT staff. The satellite will provide an educational platform as well as performing a service to amateur radio. KITSAT is an exact replica of the previous UOSAT spacecraft but with one or two additions.

KITSAT carries the latest PACSAT communications experiment (PCS) which provides an amateur packet radio forward and store system. The PCS carries 13 Mb of memory and operates with uplink/downlink speeds of 9.6 Kb. More than 200 stations already access the 9.6 Kb system on UO-22 and these stations will be immediately able to access KITSAT without any equipment expansion.

KITSAT also carries an earth imaging system (EIS). This is an upgraded system from that carried on UO-22 which has conclusively demonstrated that amateur satellites can produce interesting meteorological standard images. Equally important it has shown that the images can be easily received by simple ground station equipment.

The EIS on KITSAT consists of two CCD imagers, two lenses and a transputer (yes, transputer) image processing system. One camera will provide a wide field of view with a ground resolution of 4 Kms, whilst the other imager will provide a telephoto facility giving 400 meters resolution! This will produce images better than NOAA HRPT! The wide angle camera will be utilised as a 'spotting' camera for the hi-res imager. All images taken are processed and placed into files on the packet forward and store system allowing easy and quick access for any suitably equipped ground station.

KITSAT also carries a digital speech processing experiment and cosmic ray experiment, both of which will almost certainly enhance future AMSAT missions.

Future Missions

The following satellites are due for launch in the near future. Please note like all space missions that any of these flights could be re-scheduled if problems occur!

Phase 3D

This replacement for AO-13 is due for launch in 1995/6 on the second Ariane V5 launch, but could still move to an earlier flight on the first V5 launch. This long elliptical orbiter carries the Japanese camera experiment 'SCOPE' which will provide an earth and space imaging system. With the satellite out at 50,000 Kms apogee, this will be an interesting experiment to watch out for in the future. More information at a later date as it becomes available. Watch this space!

Sedsat

This unusual satellite is due to be launched around the end of 1993 or beginning of 1994. This will replace the weight on the end of space tether experiment flying on NASA's SEDS-2 mission. It's planned lifespan is 5 years. The satellite carries remote imaging equipment whose primary mission is to take pictures of the tether! At the end of the tether experiment (about 6 months) SEDSAT will be allowed to fly on its own, free of the tether. Other interesting experiments are also planned including a digitalker and amateur band transponders. Another interesting one to watch for.

Spot 3 Mission

No, not an amateur radio satellite but on this mission due to fly in late 1993 will be a multitude of amateur satellites! Due to fly are ITAMSAT, KITSAT B and two other amateur satellites from Portugal. Looks like its getting busy up there!

Capturing and Displaying Images

All current amateur satellites carrying remote imaging systems use Charge Coupled Device (CCD) imagers. These solid state cameras use the same technology as the latest handheld video cameras. The CCD device 'captures' an image by storing the image in RAM. The image in RAM is then transferred to the image processing computer which converts it into a form suitable for loading onto the AX25 packet radio filing system. The image processor is usually capable of other tasks too, like correcting images for geometric distortion or even adding coastlines not unlike those added to METEOSAT images. So how does a ground station go about capturing and displaying these images?

The RF links from these satellites will be discussed another time but the other equipment required is basically the same for any of the current amateur imaging satellites.

You will require:

A suitable decoder/Modem
Packet Radio TNC
Computer with software

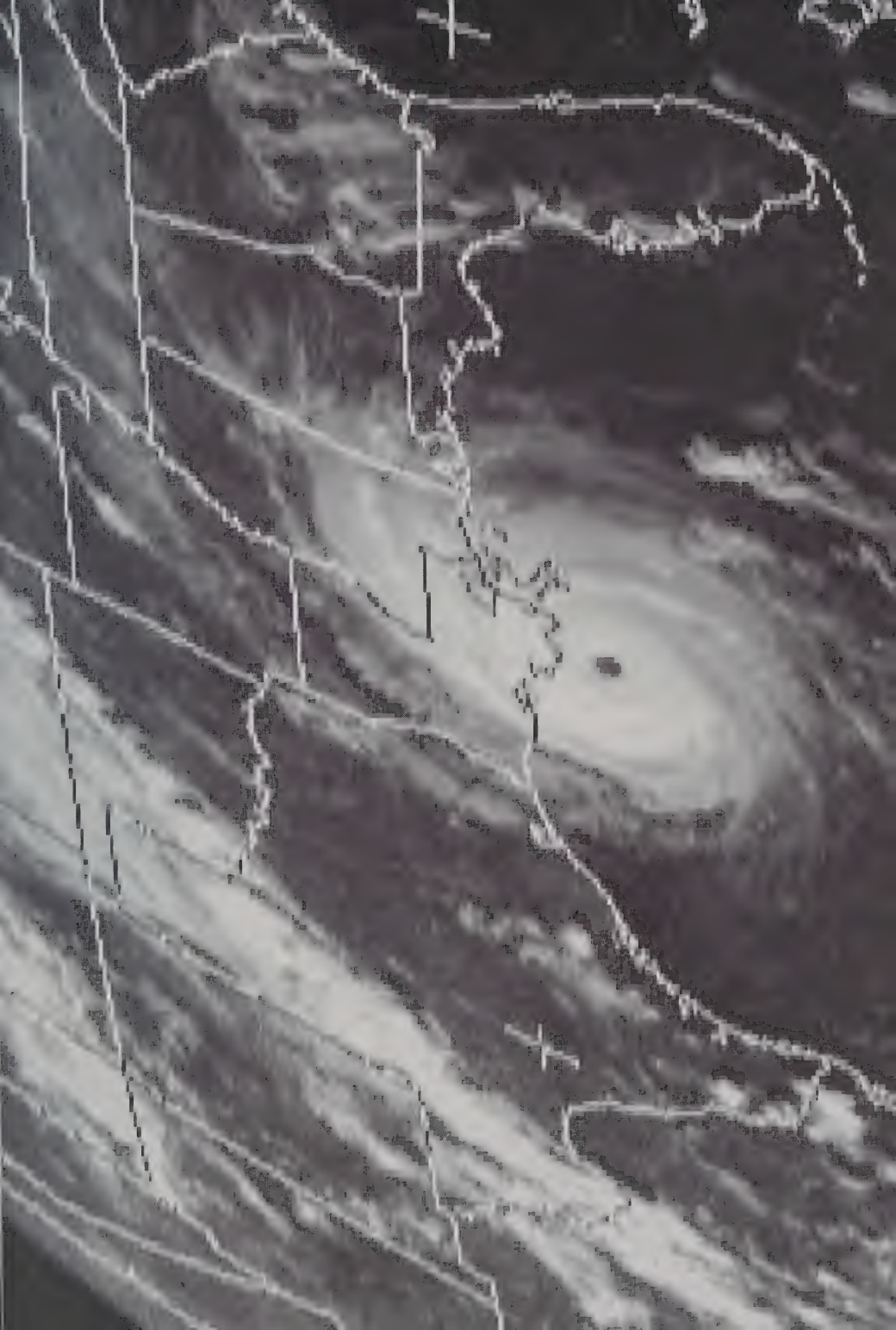
Decoders/Modems

Two systems are currently in use, one running at 1200 bauds, the other at 9600 bauds. However it should be noted that only 1 operational imaging capable satellite is running at 1200 bauds and that many others utilising the 9600 baud speed are planned, in addition to those already operational at this speed.

At 1200 bauds BPSK transmissions are employed, therefore a 1200 baud BPSK modem is needed. A suitable decoder may be purchased, IE a PSK-1, AEA DSP232. Both these modems are quite expensive and an alternative option is to build one. An excellent design was produced by James Miller G3RUH and details are available from either the author or AMSAT-UK. This modem can automatically correct for doppler shift if required as at the 70cms downlink frequencies used, the doppler shift can be as much as 16 Khz! At 9600 bauds the transmissions are much wider and not so susceptible to doppler shift. At 9600 bauds FSK is also employed. Again suitable modems are available commercially but at a price. If a TNC is already owned then for about £100 a 9600 baud modem can be added easily. You can also build one for around half this price and again James Miller G3RUH has come up with an excellent design using Digital Signal Processing (DSP). Details from either the author or AMSAT-UK.

TNC'S

Almost any packet radio TNC may be used but one small point to make about the TNC is that it should be capable of KISS operation as the ground station software controls the TNC via this mode. Also the TNC should if possible be fitted with a modem disconnect header to allow you to connect the alternative modem to it. You will have noticed that the internal modem on the TNC is useless in this application. One alternative to the expense of another TNC is to build a kit TNC such as the TNC 2 DL clone and to leave out the modem side, connecting the 1200/9600 baud modem to the disconnect header instead.



NOAA 11, HRPT CH.3
11 OCT 92 02.55 UTC



NOAA 9

PERIOD 101.94 MINS

FREQUENCY 137.62MHz

TIME OF ACQUISITION OF SIGNAL

-

52.5 DEG NORTH

0 DEG EAST

14/12	08.20	18.11	16/01	08.01	19.34	18/02	07.43	19.16
15/12	08.07	17.58	17/01	07.49	19.21	19/02	09.12	19.03
16/12	07.54	19.27	18/01	07.36	19.08	20/02	08.59	18.50
17/12	07.41	19.14	19/01	09.05	18.56	21/02	08.46	18.37
18/12	07.28	19.01	20/01	08.52	18.43	22/02	08.33	18.24
19/12	08.57	18.48	21/01	08.39	18.30	23/02	08.21	18.11
20/12	08.44	18.35	22/01	08.26	18.17	24/02	08.08	19.40
21/12	08.31	18.22	23/01	08.13	18.04	25/02	07.55	19.28
22/12	08.18	18.09	24/01	08.00	19.33	26/02	07.42	19.15
23/12	08.06	17.56	25/01	07.47	19.20	27/02	09.11	19.02
24/12	07.53	19.25	26/01	07.34	19.07	28/02	08.58	18.49
25/12	07.40	19.12	27/01	09.03	18.54	01/03	08.45	18.36
26/12	09.09	19.00	28/01	08.50	18.41	02/03	08.32	18.23
27/12	08.56	18.47	29/01	08.38	18.28	03/03	08.19	18.10
28/12	08.43	18.34	30/01	08.25	18.15	04/03	08.06	19.39
29/12	08.30	18.21	31/01	08.12	18.03	05/03	07.53	19.26
30/12	08.17	18.08	01/02	07.59	19.32	06/03	07.40	19.13
31/12	08.04	17.55	02/02	07.46	19.19	07/03	09.10	19.00
01/01	07.51	19.24	03/02	07.33	19.06	08/03	08.57	18.47
02/01	07.38	19.11	04/02	09.02	18.53	09/03	08.44	18.34
03/01	09.07	18.58	05/02	08.49	18.40	10/03	08.31	18.22
04/01	08.54	18.45	06/02	08.36	18.27	11/03	08.18	18.09
05/01	08.42	18.32	07/02	08.23	18.14	12/03	08.05	19.38
06/01	08.29	18.19	08/02	08.10	18.01	13/03	07.52	19.25
07/01	08.16	18.07	09/02	07.57	19.30	14/03	07.39	19.12
08/01	08.03	19.36	10/02	07.45	19.17	15/03	09.08	18.59
09/01	07.50	19.23	11/02	09.14	19.04	16/03	08.55	18.46
10/01	07.37	19.10	12/02	09.01	18.51	17/03	08.42	18.33
11/01	09.06	18.57	13/02	08.48	18.39	18/03	08.29	18.20
12/01	08.53	18.44	14/02	08.35	18.26	19/03	08.17	18.07
13/01	08.40	18.31	15/02	08.22	18.13	20/03	08.04	19.36
14/01	08.27	18.18	16/02	08.09	19.42	21/03	07.51	19.23
15/01	08.14	18.05	17/02	07.56	19.29	22/03	09.20	19.11

MORNING PASSES ARE SOUTHBOUND

EVENING PASSES ARE NORTHBOUND

TIME OF ACQUISITION OF SIGNAL

-

52.5 DEG NORTH

0 DEG EAST

14/12	07.46	17.32	16/01	06.16	17.43	18/02	06.27	17.54
15/12	07.22	17.08	17/01	07.33	17.19	19/02	07.44	17.30
16/12	06.58	18.25	18/01	07.09	16.55	20/02	07.19	17.06
17/12	06.34	18.01	19/01	06.45	18.12	21/02	06.55	18.22
18/12	07.51	17.37	20/01	06.20	17.48	22/02	06.31	17.58
19/12	07.26	17.13	21/01	07.37	17.23	23/02	07.48	17.34
20/12	07.02	18.30	22/01	07.13	16.59	24/02	07.24	17.10
21/12	06.38	18.05	23/01	06.49	18.16	25/02	07.00	18.27
22/12	07.55	17.41	24/01	06.25	17.52	26/02	06.35	18.03
23/12	07.31	17.17	25/01	07.42	17.28	27/02	07.52	17.38
24/12	07.07	16.53	26/01	07.17	17.04	28/02	07.28	17.14
25/12	06.42	18.10	27/01	06.53	18.21	01/03	07.04	16.50
26/12	06.18	17.46	28/01	06.29	17.56	02/03	06.40	18.07
27/12	07.35	17.21	29/01	07.46	17.32	03/03	06.15	17.43
28/12	07.11	16.57	30/01	07.22	17.08	04/03	07.32	17.19
29/12	06.47	18.14	31/01	06.58	18.25	05/03	07.08	16.54
30/12	06.23	17.50	01/02	06.33	18.01	06/03	06.44	18.11
31/12	07.40	17.26	02/02	07.50	17.37	07/03	06.20	17.47
01/01	07.15	17.02	03/02	07.26	17.12	08/03	07.37	17.23
02/01	06.51	18.19	04/02	07.02	16.48	09/03	07.13	16.59
03/01	06.27	17.54	05/02	06.38	18.05	10/03	06.48	18.16
04/01	07.44	17.30	06/02	07.55	17.41	11/03	06.24	17.51
05/01	07.20	17.06	07/02	07.31	17.17	12/03	07.41	17.27
06/01	06.56	18.23	08/02	07.06	16.52	13/03	07.17	17.03
07/01	06.31	17.59	09/02	06.42	18.09	14/03	06.53	18.20
08/01	07.48	17.35	10/02	06.18	17.45	15/03	06.28	17.56
09/01	07.24	17.10	11/02	07.35	17.21	16/03	07.45	17.32
10/01	07.00	18.27	12/02	07.11	16.57	17/03	07.21	17.07
11/01	06.36	18.03	13/02	06.46	18.14	18/03	06.57	18.24
12/01	07.53	17.39	14/02	06.22	17.50	19/03	06.33	18.00
13/01	07.29	17.15	15/02	07.39	17.25	20/03	07.50	17.36
14/01	07.04	16.51	16/02	07.15	17.01	21/03	07.25	17.12
15/01	06.40	18.07	17/02	06.51	18.18	22/03	07.01	16.47

MORNING PASSES ARE SOUTHBOUND

EVENING PASSES ARE NORTHBOUND

RIG ACTIVITY SURVEY - 1993

Are you receiving?

Polar Orbiters ☐ Geostationary ☐ HRPPT ☐ Primary Data ☐

How do you view the images?

Computer ☐ Framestore ☐ Fax ☐ Photographic Fax ☐ Other

If you use a computer for remote imaging, what type is it?

IBM PC or compatible ☐ Amiga ☐ Atari ☐ BBC ☐ Archimedes ☐
Macintosh ☐ Other

Which hardware/software do you use for viewing?

Dartcom ☐ ICS ☐ Maplin ☐ Martelec ☐ Spacetech ☐ Timestep ☐
Comar ☐ Quorum ☐ Homebrew ☐ Other

Which Receiver/Preamplifier/Downconverter do you use?

This is the last
Newsletter you will
receive until you
renew (unless your
address label says
'Paid 93').

RENEWAL 1993 NOTICE

1993 Subscriptions:-

UK members - £9
Europe (not UK) - £10
Outside Europe - £12

Do it now !

Name Call sign

Address Post code

.....

..... Country

.....

Subscription enclosed £

(Cheques payable to 'RIG')

Overseas members only payment by Visa/Master Card:-

Card No. -

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Expiry date -

--	--	--	--

Signature

Send completed Form & Survey to →

Please take time to complete the survey overleaf - it enables the committee to monitor members' activities in order to improve our service to you.

**Rig-Sub
P.O. Box 142
RICKMANSWORTH
Herts
WD3 4RQ
ENGLAND**

Please Turn Over

Martelec ☐ Maplin ☐ Homebrew (inc. RIG LNA kit) ☐ Other

General questions:-

Do you suffer from interference? ☐ Are you involved in education? ☐

If you would be prepared to tell us:- What is your occupation?

... do you have any skills/expertise relevant to remote imaging?

Please add any comments you wish to make about RIG or the Newsletter:- (use another sheet if required).

Thank you for your time. This information helps the committee guide the future of the Newsletter and RIG.

NOAA 11

PERIOD 101.98 MINS

FREQUENCY 137.62MHz

TIME OF ACQUISITION OF SIGNAL

-

52.5 DEG NORTH

0 DEG EAST

14/12	03.23	14.56	16/01	03.27	15.00	18/02	03.30	15.04
15/12	03.10	14.43	17/01	03.14	14.47	19/02	03.18	14.51
16/12	04.40	14.31	18/01	04.44	14.35	20/02	04.48	14.39
17/12	04.28	14.19	19/01	04.32	14.23	21/02	04.36	14.27
18/12	04.16	14.07	20/01	04.20	14.11	22/02	04.23	14.14
19/12	04.03	13.54	21/01	04.07	13.59	23/02	04.11	14.02
20/12	03.51	13.42	22/01	03.55	13.46	24/02	03.59	13.50
21/12	03.39	15.12	23/01	03.43	15.16	25/02	03.47	15.20
22/12	03.27	15.00	24/01	03.31	15.04	26/02	03.34	15.07
23/12	03.14	14.47	25/01	03.18	14.52	27/02	03.22	14.55
24/12	04.44	14.35	26/01	04.48	14.39	28/02	04.52	14.43
25/12	04.32	14.23	27/01	04.36	14.27	01/03	04.40	14.31
26/12	04.20	14.11	28/01	04.24	14.15	02/03	04.27	14.18
27/12	04.07	13.59	29/01	04.11	14.03	03/03	04.15	14.06
28/12	03.55	13.46	30/01	03.59	13.50	04/03	04.03	13.54
29/12	03.43	15.16	31/01	03.47	15.20	05/03	03.51	15.24
30/12	03.31	15.04	01/02	03.35	15.08	06/03	03.38	15.11
31/12	03.19	14.52	02/02	03.22	14.56	07/03	03.26	14.59
01/01	04.48	14.39	03/02	04.52	14.43	08/03	04.56	14.47
02/01	04.36	14.27	04/02	04.40	14.31	09/03	04.44	14.35
03/01	04.24	14.15	05/02	04.28	14.19	10/03	04.31	14.22
04/01	04.12	14.03	06/02	04.15	14.07	11/03	04.19	14.10
05/01	03.59	13.50	07/02	04.03	13.54	12/03	04.07	13.58
06/01	03.47	13.38	08/02	03.51	13.42	13/03	03.54	13.46
07/01	03.35	15.08	09/02	03.39	15.12	14/03	03.42	15.15
08/01	03.23	14.56	10/02	03.26	15.00	15/03	03.30	15.03
09/01	04.52	14.43	11/02	04.56	14.47	16/03	05.00	14.51
10/01	04.40	14.31	12/02	04.44	14.35	17/03	04.47	14.39
11/01	04.28	14.19	13/02	04.32	14.23	18/03	04.35	14.26
12/01	04.16	14.07	14/02	04.19	14.11	19/03	04.23	14.14
13/01	04.03	13.54	15/02	04.07	13.58	20/03	04.11	14.02
14/01	03.51	13.42	16/02	03.55	13.46	21/03	03.58	13.49
15/01	03.39	15.12	17/02	03.43	15.16	22/03	03.46	15.19

MORNING PASSES ARE SOUTHBOUND

EVENING PASSES ARE NORTHBOUND

TIME OF ACQUISITION OF SIGNAL

-

52.5 DEG NORTH

0 DEG EAST

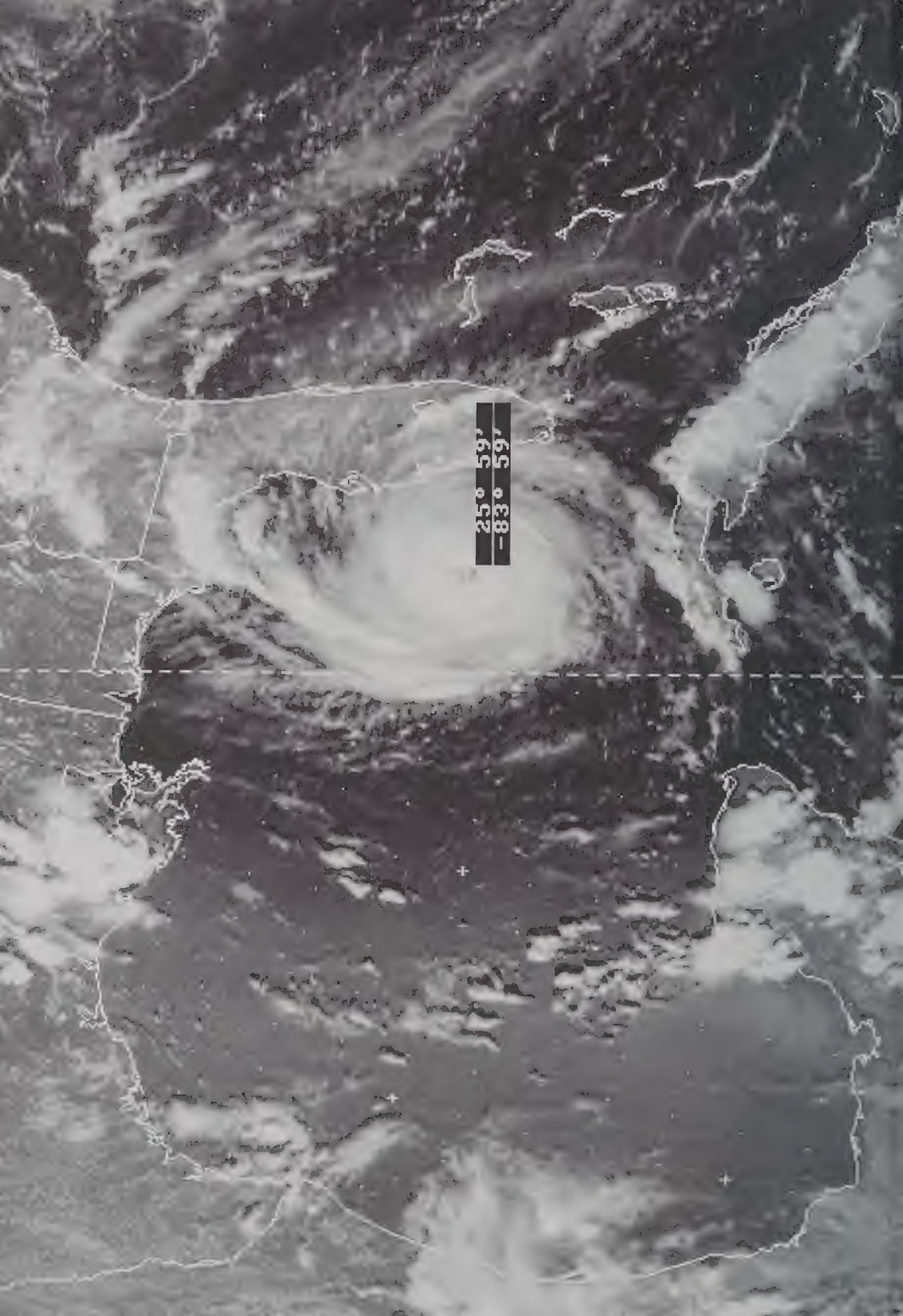
14/12	07.14	18.42	16/01	07.09	18.38	18/02	08.46	18.33
15/12	08.34	18.21	17/01	08.29	18.16	19/02	08.24	18.11
16/12	08.12	17.59	18/01	08.07	17.55	20/02	08.02	17.50
17/12	07.50	19.19	19/01	07.46	19.14	21/02	07.41	19.09
18/12	07.29	18.57	20/01	07.24	18.53	22/02	07.19	18.48
19/12	08.48	18.36	21/01	08.44	18.31	23/02	08.39	18.26
20/12	08.27	18.14	22/01	08.22	18.09	24/02	08.17	18.04
21/12	08.05	17.52	23/01	08.01	17.48	25/02	07.55	17.43
22/12	07.44	19.12	24/01	07.39	19.07	26/02	07.34	19.02
23/12	07.22	18.50	25/01	07.17	18.46	27/02	07.12	18.41
24/12	08.42	18.29	26/01	08.37	18.24	28/02	08.32	18.19
25/12	08.20	18.07	27/01	08.15	18.02	01/03	08.10	17.57
26/12	07.58	17.46	28/01	07.54	17.41	02/03	07.48	19.17
27/12	07.37	19.05	29/01	07.32	19.01	03/03	07.27	18.55
28/12	07.15	18.44	30/01	07.10	18.39	04/03	08.46	18.34
29/12	08.35	18.22	31/01	08.30	18.17	05/03	08.25	18.12
30/12	08.13	18.00	01/02	08.08	17.56	06/03	08.03	17.50
31/12	07.52	19.20	02/02	07.47	19.15	07/03	07.42	19.10
01/01	07.30	18.58	03/02	07.25	18.54	08/03	07.20	18.48
02/01	08.50	18.37	04/02	08.45	18.32	09/03	08.40	18.27
03/01	08.28	18.15	05/02	08.23	18.10	10/03	08.18	18.05
04/01	08.06	17.54	06/02	08.01	17.49	11/03	07.56	17.43
05/01	07.45	19.13	07/02	07.40	19.08	12/03	07.35	19.03
06/01	07.23	18.52	08/02	07.18	18.47	13/03	07.13	18.41
07/01	08.43	18.30	09/02	08.38	18.25	14/03	08.33	18.20
08/01	08.21	18.08	10/02	08.16	18.03	15/03	08.11	17.58
09/01	07.59	17.47	11/02	07.55	17.42	16/03	07.49	19.18
10/01	07.38	19.06	12/02	07.33	19.01	17/03	07.28	18.56
11/01	07.16	18.45	13/02	07.11	18.40	18/03	08.47	18.34
12/01	08.36	18.23	14/02	08.31	18.18	19/03	08.26	18.13
13/01	08.14	18.01	15/02	08.09	17.57	20/03	08.04	17.51
14/01	07.53	19.21	16/02	07.48	19.16	21/03	07.42	19.11
15/01	07.31	19.00	17/02	07.26	18.55	22/03	07.21	18.49

MORNING PASSES ARE SOUTHBOUND

EVENING PASSES ARE NORTHBOUND

METEOR 3-3 IR
10 OCT 92 21.40 UTC





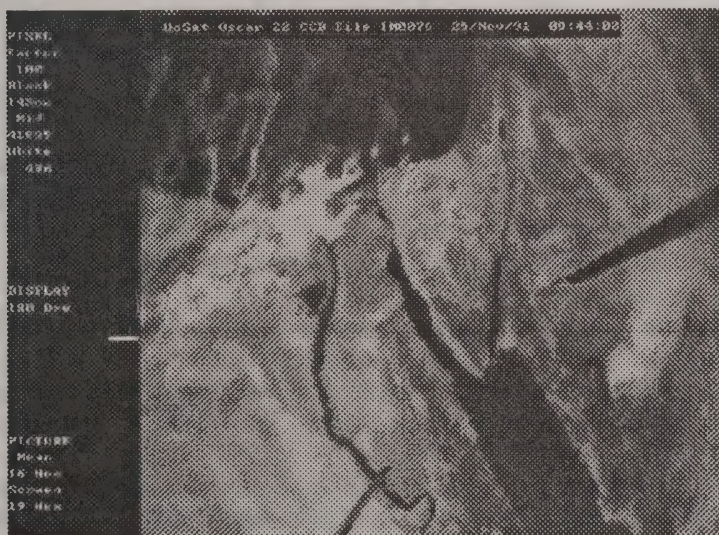
25° 59'
-83° 59'

Computers and Software

The main computer in use for amateur packet and imaging at present is the IBM compatible. Not surprising really as it must be the most popular computer with radio amateurs ever. However owners of other computers should not be put off as capture and display software is also available for other machines too. Interested parties should contact either the author or AMSAT-UK for details. To download the images off the satellite the ground station user must use a system called FTLO, this is the protocol the satellites presently use. The software controls the TNC and converts the RAW data stream from the TNC and captures it as a disk file. This file then needs to be converted into a form suitable for viewing or further processing. Again software for various computers is available although owners of IBM PC's will find many more programs available. I personally convert these files to GIF images which allows me to use the excellent CSHOW program.

If the ground station is equipped with an IBM PC and a 9600 baud system, you are almost certain to remain capable of capturing and decoding images for many years to come as this seems to be the most flexible system at present. However the world of amateur remote imaging is moving fast and future developments cannot be ruled out.

Next time we will look at the RF systems required to receive these satellites and take a quick look at what 'birds' are available. I also hope to be able to show you some images from the new KITSAT satellite.



A typical UoSat Oscar 22 Image

THE NOAA SATELLITES ARE IN SUN-SYNCHRONOUS ORBITS. TRUE OR FALSE?

Peter Wakelin

When an orbit is sun-synchronous any point on the Earth's surface passes through the plane of the orbit at the same time every day. To achieve this the orbit must precess through 360 degrees in a year, or a little under a degree a day to compensate for the Earth's motion around the sun. Listed below are the local times of northbound equator crossings at six-monthly intervals since launch for the four satellites currently operating.

Date	NOAA 9	NOAA 10	NOAA 11	NOAA 12
1 Jan 1985	1420			
1 Jul 1985	1427			
1 Jan 1986	1436			
1 Jul 1986	1447			
1 Jan 1987	1501	1933		
1 Jul 1987	1517	1935		
1 Jan 1988	1535	1937		
1 Jul 1988	1555	1937		
1 Jan 1989	1617	1936	1341	
1 Jul 1989	1641	1933	1348	
1 Jan 1990	1707	1929	1356	
1 Jul 1990	1734	1923	1406	
1 Jan 1991	1802	1917	1419	
1 Jul 1991	1830	1909	1435	1931
1 Jan 1992	1858	1901	1452	1933
1 Jul 1992	1924	1852	1510	1934

The variables in the equation for determining precession are the orbital period and the inclination of the orbital plain. For any planned height for a satellite (height is related to period) there is only one inclination the satellite must attain at launch for it to achieve a sun-synchronous orbit.

So why are the times in the above columns not constant? NOAA 9 started as an afternoon satellite but is now an evening one and NOAA 11 is heading in the same direction. NOAA 10 started off well but is now coming earlier. NOAA 12 is a well-behaved recent arrival.

In addition to the need to be launched in to a precise orbit the period and inclination need to remain constant for the satellite to remain truly

sun-synchronous. Unfortunately this does not happen. Even at 800 Km there is sufficient atmosphere to slowly decrease the period and various perturbing forces cause the inclination to change. The above figures suggest that the even-numbered satellites (the evening ones in 820 Km orbits) do better than the odd-numbered ones in 850 Km afternoon orbits. A close examination of two-line elements for these objects shows that the inclination of those in afternoon orbits increases by 0.05 degrees a year while for those in evening orbits there is a decrease in inclination of a similar magnitude. This is probably due to the differing directions of action of the very small pressure exerted by sunlight which, by the very nature of sun-synchronous orbits, will have a cumulative effect. The effect of atmospheric drag will decrease the period of both afternoon and evening satellites and will affect precession similarly.

On evening orbits the combined effect of changes in inclination and period is small at first as the signs of the components differ but for the afternoon orbits the signs are the same, hence the combined effect is larger resulting in a more rapid departure from truly sun-synchronous orbits. These satellites were designed for about 3 years' use but NOAA 9 is now 8 years old. As this satellite precessed from afternoon to evening passes its inclination stopped increasing and since mid 1990 has been decreasing. This shows in the above table. The acceleration in precession stopped in 1991 and has reversed in 1992.

FOR SALE...

Amigasat V.2.0 weather satellite hardware and software with manual, for the AMIGA 500 computer £110 O.N.O.

Mr Keith Marriott, Hucknall, Nottingham Tel: 0602 638964

FOR SALE...

1 Spun aluminium 1 Metre RIG dish, unused, No horn, £30.
Cash only, and purchaser collects.

MIKE HORROCKS, G8GTP, Whitefield, Manchester. Tel: 061 7666269

SOME NEW MOBILE RADIO FREQUENCY ALLOCATIONS

Roger Belcher

Readers' letters and comments in RIG have for some time noted with concern the emphasis on modern sophisticated (i.e. more complicated) equipment and weather satellite systems. The wish is often to stay with the more simple equipment and techniques and to resist change for as long as possible.

I well remember in the '50s buying an R107 (an ex-Government short wave receiver) in Tottenham Court Road, climbing the tree at the end of our garden to fix a "long wire" aerial and switching on to receive the World. I listened to amateurs from all over Europe, the Americas and the rest of the world. I took Radcom and Short Wave Magazine and became interested in the technical whys and hows of radios and signals. Articles started to appear in the magazines on the merits of single and suppressed carrier double side band (SSB and DSBSC). Very interesting but of no direct relevance to me. More and more stations appeared on the shrinking and shared (not always legally) amateur bands and so a finer and finer hand was needed to tune them. Then later came stations seeming impossible to tune - I did not realise Donald Duck had got a licence. Then I realised what was happening. Changes in the military, commercial and professional radio world were effecting the radio amateur. These people had negotiating power and were lobbying hard to take more spectrum as they wanted it. Amateur operators faced with reducing (or shared bandwidth) reacted by getting technically smarter, and one either adopted these new techniques or got left behind.

Initially the changes could only be made by following constructional articles in Radcom etc. but the amateur equipment suppliers eventually re-acted taking on board the changes and making 'off the shelf' equipment available. So, amateurs who were not interested in building their own rigs could (after a delay) purchase this new technology equipment.

The same applies to the weather satellite receiving world. Commercial interests (Mobile Radio operators) are moving ever closer to our frequencies and as we shall see, soon will be in amongst our channels. In order to enable the mobile radios to work at these frequencies and narrow channel spacings, the commercial component manufacturers are making new generation highly specified low cost components (achieved through the enormous quantities used by the mobile radio market). This can be turned to our advantage. We can incorporate these developing techniques and

technologies into our new designs to keep (or improve) our system performance. Just look at all the comments relating to low noise front end devices and dish sizes. GaAs FETs were once the exclusive property of the military, then came the commercial development of direct broadcast satellite (DBS) television. This gave rise to GaAs FETs with good performance at 12 GHz but not necessarily optimum for L band. Now comes GPS (Global Positioning System) working at L band and this is bringing devices ideal for Meteosat front end requirements. However, we must take care that ALL aspects of our systems keep pace otherwise nasty signals will creep through the chinks in our armour. For example, not much attention has been paid to image rejection on Meteosat receivers ($1.69\text{GHz} \pm (2 \times \text{if})$). After all the directivity of a dish is a pretty good front end filter and there has not been a lot of activity at these image frequencies anyway. Things are changing... LEOs are coming!

Satellite communications have been in use for over thirty years, mainly maritime and aeronautical. FIXED link satcoms date back to 1965. What now is coming, is the revolution of the MOBILE satellite communication service. New (and fully costed) proposals relate to hemi-spheric and fully global mobile communications.

Systems are proposed that will make possible calls to and from any point on the earth's surface (pole to pole, mountain top to ocean). But, not only remote place to remote place importantly, city to city calls can be made without local public telephone system network (PSTN) routing (watch the politics on that one!). Services provided will include speech, data, paging, fax, location and navigation. How will it be achieved and at what cost?

LEOs. Low Earth Orbiting Satellites.

These satellites use orbits well below synchronous height. The past three decades have seen a boom in the use of geo-stationary satellites placed in the equatorial Clarke Belt. Prime advantages of these systems are that the earth's surface can be covered with few satellites (min 3) and steerable antennas are not required. The problem with these systems is the large power budget required (due to path length, 22000 miles), particularly limiting for hand held mobiles. Another problem is of satellite and launch cost, geo-synchronous launches require large expensive rockets and must be booked years ahead.

However industry is now able to produce light weight low cost satellite components. Using these components the "throw away" satellite is now a reality. For this reason and also those of small cheap competitive rocket

launch vehicles nearly all new proposals are based on LEOs. To provide global coverage business consortiums propose using between 20 and 80 satellites per system. Low cost is a relative term and to finance these massive systems all but one proposal comes from large multi-national consortia. These consortia have lobbied their local governments (mainly American) to licence such systems. Licences have been granted and so the consortia have taken the next steps. These next steps have been to obtain frequencies for their proposed systems.

Requests for specific frequencies and bands are made at the World Administrative Radio Conference (WARC). These conferences are held every 10 years and the last one was at Malaga, Torremolinos in February and March 1992. This conference decided frequency allocations for the next 10 - 20 years and was attended by more than 1400 delegates from 127 countries. Some discussions were extremely vigorous with the USA giving little ground and applying great pressure to developing countries to see things their way. Europe, with its recent history of co-operation on GSM (The Pan European Digital Cellular System) had a well co-ordinated lobby and hence achieved most of its objectives.

So, what decisions were made and what does it mean for the Weather Satellite community.

First, a definition: Primary status gives priority rights to that user on an allocated frequency. Secondary status means that the user must comply with rigorous non-interference restrictions to the primary user on a particular frequency (or band). For the completeness of this article HF changes are also included.

a. A total of 790 kHz of additional spectrum below 10 MHz was allocated to broadcasting and 590 kHz between 11 and 19 MHz.

5900 - 5950 kHz

7300 - 7350

9400 - 9500

11600 - 11650

12050 - 12100

13570 - 13600

13800 - 13870

15600 - 15800

17480 - 17550

18900 - 19020

Introduction of SSB on shortwave broadcast bands is to be made compulsory and cessation of DSB (AM) by the end of the year 2015. As there are some 100 million short wave broadcast listeners world wide the set manufacturers lobbied strongly for this one.

b. Another definition:

Little LEOs - below 1 GHz,

Big LEOs - above 1 GHz.

Little LEO primary allocations were made at

137.000 - 137.025 MHz

137.175 - 137.825 MHz

148.000 - 149.900 MHz

400.150 - 401.000 Mhz.

Secondary allocations were made at

137.025 - 137.175 MHz and 137.825 - 138.000 Mhz.

Additional primary world wide allocations were made at 149.90 - 150.05 Mhz and secondaries at 312.00 - 315.00 MHz and 387 - 390 MHz. Most of the above services are for low data rate communications, paging, position location, fax etc. Test satellites are already in orbit and services are expected to start in the next 18 - 24 months. Note the frequencies - look familiar? Weather satellite receiver specifications will need to be good!

c. How about escaping to L band (1.69 GHz) - there we will find the big LEOs - the commercial concerns are coming there in force. Frequency allocations include:

Primary:

1525.00 - 1530.00 MHz,

1492.00 - 1525.00 MHz,

1610.00 - 1626.50 MHz,

2483.50 - 2520.00 MHz,

1626.50 - 1631.50 MHz

Secondary:

1613.80 - 1626.50 MHz.

Many other allocations were made in the 1.80 - 2.70 GHz bands. Some allocations are to be used only over Europe, some only over America. Satellites will be switched on as they pass over countries giving permission

for communication and switched off as they pass over countries refusing permission. Modulation methods vary from frequency domain (FDMA) to the time domain (TDMA) systems and also the spread spectrum system (CDMA) is under consideration. Time scales run from 12 months hence to 2010 for total communication systems.

It maybe interesting to look at one system in a little more detail. E.g. Motorola have proposed and been allocated frequencies for a global satellite network. It will use 10.50 MHz between 1616.00 MHz 1626.50 MHz for its service. The original proposal used a network of 77 satellites (hence is called Iridium - the 77th element) to provide full global coverage. A few figures relating to this number are interesting.

The average life expectancy of each satellite is estimated to be approx. 5 to 6 years. If the system uses 77 satellites then a new satellite will be required to be launched every $6 \times 365 / 77 = 29$ days. 66 is the number of satellites now proposed for use and each will project 48 beams (an increase of 11 over the original proposal) giving a renewal interval of 33 days.

Iridium Inc. formed as the commercial vehicle has just placed a US \$3.37 billion contract with Motorola Inc to construct and launch for service in early 1998. The US FCC has already awarded an experimental licence to Motorola to build and launch 5 test satellites. The initial mobile units will probably be briefcase size, providing voice, facsimile and data service although the push is on to develop hand held units.

Motorola expects the hand held phones to cost \$3000 - \$3500 and calls to average \$3 per minute but these costings are being challenged by other players.

There are, of course, other competing systems proposed and it is thought that at least 2 or 3 will come to reality.

Summary

The commercial pressures to obtain payback on huge investments (political and technical) will ensure consortia rush to commission systems. It is possible that due to the complications and complexities of new digital systems introduction will be slower than forecast (ref GSM) but it will happen. In order for our systems to work at consistently high performance the engineer will need all his/her skills to make maximum use of each new technology. The benefits through this approach will be very rewarding, e.g.

PDUS, HRPT, AVHRR, MDS (I wish I knew what they all meant!). compact frame stores, portable stations etc. However, specifications will need to be equal to the task.

This article has only touched on the most relevant points but I hope gives a flavour of one direction that the communications industry is moving.

We live in interesting times.

FOR SALE...

Facsimile Paper-roll printer, Muirhead Courier, modified for Wefax. 240 v mains. Technical information. Some paper rolls included, but condition not certain. Also associated Fax transmitter unit. Prefer Buyer inspect and collect. £40.00

Parabolic dish with 1.65 Ghz feedhorn. Home constructed of thin aluminium petals bolted together. Light-weight, hence not mechanically robust, but used very successfully for METEOSAT reception. 1.2m diameter. 0.18m depth. Focal length approx 0.5m. Approx 45db gain. Wooden tripod. Petals can be dismantled with patience for transporting. I.e. 150 small nuts and bolts. Buyer to collect and dismantle if required. £10.00

Quantity three 42MHz crystals for Wefax reception on 137.2, 137.5 137.65 Mhz. Originally intended for use with Pye Cambridge or Westminster receivers. Formula is crystal frequency x 3 plus 10.7MHz = receive frequency. £6.00 for three including postage.

Mr. E. Chicken, MBE, 21, Townsend Crescent, Kirkhill, Morpeth, Northumberland, NE61 2XP. Tel: 0670 513994

FOR SALE...

One Post Script Laser printer with 2mb board (fits in computer). JLASER TALL TREES SYSTEM. £300

Bob Bushell, Sandown, Isle of Wight. Tel: 0983 402273

HURRICANE ANDREW

James Brown

Americans call it 'looking down the barrel of a gun', meteorologists call it the hurricane season. Either way, each year from high Summer to Autumn both the Pacific basin and the Atlantic basin can expect to spawn a number of hurricanes. They are named in alphabetical order, and in the Atlantic we got about as far as Charley. However the name that sticks in everyone's mind is Andrew.

Andrew started life as a baby depression coming out of West Africa around August 13th. By the 17th. it had drifted to about 50 West and 15 North, and had all but given up the ghost. But by the 21st. things had changed dramatically. An upper low pressure area which had been holding back the development of the little monster gave way, and it started to gather strength. It only took one more day for Andrew to get his act together and develop a closed circulation and with it the familiar 'eye'. But which direction would he take? The storm was so far to the north-west that one might have assumed it would do the familiar trick of recurving into the north Atlantic and eventually come our way having entered old age as an ordinary depression. However, Andrew had other ideas. With help from a powerful female relative to the north (anticyclone!), Andrew began to move west. By the 23rd. plane flights across the hurricane were reporting upper wind speeds of 196 mph! People were fleeing from its path. On the morning of August 24th., it was time to say good-bye to Southern Florida! As the President declared it a disaster area, Andrew had taken a terrible toll. 24 or more lives lost, 20+ billion dollars worth of damage done, 60,000 homes completely destroyed.

Meanwhile back at the ranch it was decision time. Do I uproot my 2 metre dish and try and prop it up at the bottom of the garden in the hope of receiving live METEOSAT 3 PDUS transmissions. The weather was reasonable so... a few screws later and the dish is rolling down the lawn, carving an interesting track of its own! Several pieces of wood later, and with one eye on a portable meter, METEOSAT 3 is coming up fairly strong. However I've forgotten about polarisation, so a bit of juggling with the dish, (just as well I'm almost two meters in height myself!) and the gain has increased again. Shooting indoors reveals that PDUS images are coming through with hardly a missing pixel. I'm half-way through a third image, and suddenly the signal disappears. Not a dicky bird! The meter is on zero. Move swiftly outside to find that the wind has got up, it's started to rain, and the dish is now lying inelegantly flat on its back! End of reception.

After finding Florida a bit of a drag, Andrew set off in search of more plunder. Again he gathered strength over the Gulf of Mexico, and with a most evil looking eye, he at last chose Louisiana on the 26th. to make his final thrust. Winds in excess of 140 mph some 75 miles in all directions from the centre lashed the coast for hours. Because the area is very much less populated than Florida, damage was much more limited, but by now 250,000 people were homeless. Soon Andrew was no more. Cut off from the warm waters and fighting against the drag of land features, he quickly gave up the struggle, but not before he had entered the record books as the worst storm for 60 years.

Just before completing this article, a review copy of Timestep's Multi-Spectral View II arrived, complete with a Genoa 7900 (32k of colours per pixel in 640 x 480 mode) video card. There was no manual, but some impressive images from Hurricane Andrew were included, as well as HRPT pictures of the Southern British Isles etc. The idea seems to be that images from the various infra-red and visual channels are fed into three memory banks designated red, green and blue, and by careful manipulation they can be added, subtracted, filtered, varied in contrast etc, so that the overlays produce images with colour information hitherto difficult to identify. The programme as such worked faultlessly, but without a manual one could only guess at what the various effects and controls were achieving. The most obvious benefit of such a programme is that infra-red information overlain on visual information, but given specific colour information, enables the user to see the complete meteorological picture at a glance. Hopefully we will be able to give more details next time.

FOR SALE...

Griffin/Timestep Colour Frame Store £100 O.N.O.

YU3 UMV All Pcb's etc. and components and wired P.S. Not tested or powered up. Cased £50

Carriage etc. extra.

John Wilson, Annabank, Ayr Tel: 0292 520580

A SHORT REVIEW OF SATFAX V.5 SOFTWARE

R.T.Whitby, G8MEI

The WEFAX interface board has already been reviewed in RIG No 29. It appears there had been some problems in getting this software up and running so I did not rate my chances much.

The computer here is a 386SX, homebuild, running at about 20 MHZ and the video card is a TRIDENT 89000B with 1 meg of ram. It has a 60 meg hard drive, of which 20 meg is used for weather satellite work; no room for games.

About 500K is required to load all of the SATFAX programs from the distribution disk, including a sample fax picture. So to work... A quick scan through the manual. A little fragmented, but consists of 37 or so double sided pages of information on what equipment is required and how to set up port addresses. The quick scan turned into reading it cover to cover several times to extract information on the set up.

There is a main menu screen with four sub menu screens. The main menu is for management of the received picture. Settings for starting with or without sync, moving picture left or right, zooming, magnifying, and also the setting up the video card. It covers most of the popular video cards.

The settings sub menu is for setting up hardware or software clock speed to give straight sided pictures. I found this to be a bit hit and miss to start with. Using the function keys to set the coarse and fine clock speed tuning, one has to find which keys slope the picture to the left or right. No more than 1 or 2 units on the coarse key but maybe several hundred on the fine keys, but once set and stored I found that it held for both the orbital and Meteosat satellites.

The test sub menu is for setting up signal input levels. In my case I had to do this externally to the WEFAX board, as the only slot in the computer was under the power unit.

The system is very good, and is better than Timestep Prosat 2, in one respect, as one does not have to go out of the program to set the levels, and they are calibrated in units of 0 to 255.

There are two other sub menus: one for printing pictures on EPSON type printers; and one for much better pictures using a laser printer. A file sub

menu also allows you to save screens to animate a group of pictures; similar to Proanimate in Prosat 2.

One thing I found was that all Meteosat and afternoon orbital pictures are upside down! Perhaps this is OK down under!

There is a lot to this software that I have not covered as there are 37 pages in the manual, and this is only a short review.

All in all, once I had got used to the software I liked it, and would like to see more of it in this country. Perhaps someone can produce the bare board and sell though RIG, including the software, as well as making the necessary arrangements with the author in Australia.

FOR SALE...

PK232 terminal controller with RUH modem I/F, IBM or AMIGA s/w £195.00

FO20 RUH modem, built and working £20.00

AO13 RUH modem, built and working £20.00

Rudac modem by AMSAT DL with most parts £12.00

AOR 2000 Scanning Rx, 1000 mem, 100kHz -1300mHz, new boxed £210.00

MM 23cm/2m Transverter £175.00

Windrush 6809 microprocessor development system. Full S/W. Call for spec £350.00

Cirkit 4 band VHF converter, 2 bands fitted. £35.00

All above items can be demonstrated and have full documentation.

WANTED ICOM ICR7100 receiver, with or without HF and computer I/F Fast A to D card for IBM PC preferably with DMA.

Phone Andy, Guildford 0483 425900 Ex. 3349 daytime or 0483 34954 evenings.

AMIGA USERS... Andy has produced a graphics satellite tracking programme if anybody is interested.

DARTCOM SCANNER EPROM MODIFICATION

Mike Goodall

For those of you with the RIG Dartcom Scanning RX there is a useful modification, available to all those who have some computer skills and access to an Eprom Programmer. The 2732 (32K) Eprom contains all the information as to the frequencies scanned. Most users leave it set to the same block, which contains the Noaas and Russian Met series. However, as there is occasionally some rubbish on the extra five unused channels, 137.06, .10, .13, .15 and .70, which can hang up the squelch, it seems logical to miss these out and scan only the channels which are required. The only ones used at the time of going to press are 137.50 and 137.62 (Noaas) and 137.30, 137.40 and 137.85 (Mets).

To reprogram the first block is simple: just replace the data in addresses 010 to 0AF inclusive. If you do a dump of the Eprom in HEX all will be obvious. The first ten bytes in each line have to be changed and repeated for the remaining nine lines.

The original lines read...

5C 60 63 65 74 7E 88 94 9C AB FF FF FF FF FF FF

These need to be changed to...

74 7E 88 94 AB 74 7E 88 94 AB FF FF FF FF FF FF

The five required channels will now be scanned 20 times in this block.

If you think that other satellites may reappear (i.e. Fen Yung?) then you can always replace one byte that represents the correct frequency, just once, somewhere in the whole ten line block. This frequency will only be scanned about once every 3 minutes; the others will be scanned every 10 seconds or so. If you need it to scan it more often, once every other line would do.

For those of you interested, the frequency versus data can easily be worked out. There are two other blocks of data in the Eprom that cover 136.00 to 136.99 and 137.00 to 137.99. These show that the data is incremented by 1hex for every 10 KHz.; 136.00 = F2 up to 136.13 = FF. The sequence then restarts 136.14 = 00, 136.15 = 01, up to 137.99 = B9.

Any speed 2732 can be used, as the access rate is very low, but the 27C32 (CMOS) version may not work (I have not tried it!). Although 2732's are getting hard to find these days, you may be able to pick up some used ones at the rallies. Another option would be to use 2764's or greater, and make a header plug and socket to contain it, rewiring with the necessary modifications, although this may look a little untidy.

INTERPRETING WEATHER SATELLITE IMAGERY - PART 2

Peter Wakelin

In the last journal I wrote about an eastward-moving depression which crossed northern Britain in July. Numerous others followed which resulted in a cooler and wetter summer than much of northern Europe had experienced in years. By early October this west to east flow was effectively blocked when a large anticyclone developed to the west of the British Isles and pressure dropped over the western Mediterranean. Britain started to dry out but some very violent thunderstorms affected southern France and the nearby islands. Nice recorded almost as much rain in 4 days as London had throughout the wet summer.

My two images were received on the night of 10/11 October when storms were still raging in this area. The METEOR 3-3 infra-red picture, received at 2140, covers almost the same area as the inset chart which depicts the surface pressure pattern at midnight. The NOAA 11 HRPT channel 3 image, timed about 5 hours later than the METEOR, is a larger scale view of the area near the centre of the depression. Some land areas can be identified on the images. On the METEOR picture northern France is cloud-free and colder than the adjacent sea which appears darker. *[I have "inverted" black and white on the METEOR image to render it comparable with the NOAA one].* The Algerian coast is just discernible. An atlas may be helpful in identifying Majorca, Minorca and the Gulf of Lions coast on the NOAA image. Sardinia and Corsica are partly obscured by cloud at centre right.

The cloud on the METEOR picture can be divided into 3 main areas. In the west the large areas of uniform dark grey (hence warm and low) are typical of winter anticyclones. In the east is a large amount of layered frontal cloud but the bright, white areas in the north are the tops of cumulonimbus clouds which are convective clouds of great vertical extent. The rather chaotic-looking cloud over southern France and Spain is probably the remains of showers and thunderstorms which have circulated around the depression but have now lost their heat source below. On the NOAA image individual cumulonimbus clouds can be seen. Those with sharp edges are new, developing ones. The mature ones, like the one just east of Minorca, begin to develop "fibrous" tops as ice crystals begin to spread out. The fibrous area northwest of Minorca appears to be rotating and may be the remains of the pair of cumulonimbus clouds shown on the METEOR image. The marked discontinuity in sea surface temperature evident off the Costa Brava measures almost 5 degrees and is probably the result of vast quantities of cold river water flowing into the Gulf of Lion.

On the surface pressure chart I have indicated the direction of flow on some of the isobars. As air is subsiding in anticyclones and rising in depressions (see RIG 30) there clearly must be some flow across the isobars outwards from anticyclones and into depressions but the isobars do give a close approximation to the direction of flow. Therefore we have a situation where a steady flow of air from high latitudes is finding its way to the western Mediterranean by way of Spain. It is the heating of this cold air by the warm sea which results in the convective activity. Moisture is the other essential ingredient of convective clouds and at 18 degrees the sea is evaporating nicely. Near the Spanish coast cumulonimbus clouds are absent or very isolated. The air has to travel some distance over the sea to accumulate a significant moisture content. As this is a typical winter rainfall situation in this part of the world it is not surprising that Italy receives about twice as much winter rain as eastern Spain (and 3 times as much as London!).

Most cumulonimbus clouds produce showers but why do some develop into thunderstorms? The electrostatic charge generating processes are complex and several different ones may be at work simultaneously. The essential ingredient is ice. As convective clouds develop and tops rise through the zero degree level ice does not form immediately. Water drops can remain liquid to very low temperatures. At -10 ice particles start to develop and by about -40 all the particles are solid. Therefore, over a considerable depth of the cloud water and ice co-exist. When supercooled water contacts an ice particle it freezes almost instantly and minute fragments of ice with a positive charge are thrown off and the ice particle becomes negative. The small positive fragments remain aloft and the heavier negative ice particles fall so the top of the cloud becomes positively charged and the base negative and a positive charge is induced on the ground below. All cumulonimbus clouds will develop electrostatic charge as their tops reach the necessary temperatures but only in those with very cold tops (typically -50C) will the charge be high enough to break down the insulating properties of air and create a lightning flash. The flash can occur between clouds or between ground and cloud. If the flash appears diffused by cloud or precipitation it is popularly called "sheet" lightning.

Finally, here are some numbers relating to thunderstorms: Charge generation can produce a flash about every 20 seconds in an active storm and 100 million is a typical voltage for a flash. About 1800 storms are raging worldwide at any time maintaining an upward current flow of around 1000 amps. This is balanced by downward ionisation currents in fair weather areas. Worldwide about 20% of flashes are ground to cloud and 80% cloud to cloud. *[Pictures relating to this article are in Centrefold].*

THE GIF PICTURE LIBRARY

MIKE GODDALL



The following are available at present:

- Disk 1 UK Noaa: in colour (x5)
 - Disk 2 UK Noaa: most in colour (x5)
 - Disk 3 Americas: various (x9)
 - Disk 4 Americas: various (x8)
 - Disk 5 Americas: various (x7)
 - Disk 6 Space: Spaceman, Launch, Mars, Venus, Saturn, Earth (x5)
 - Disk 7 Earth: various HRPT, plus GMS4 (x8)
 - Disk 8 Russian Meteor: Various (x5)
 - Disk 9 Various (x9)
 - Disk 10 Russian Meteor/Landsat: USA (x4)
 - Disk 11 AusGMS and Noaas (x4)
 - Disk 12 Mets and Noaas (x4)
 - Disk 13 HRPT: Italy and Greece by Marciano Righini (x6)
 - Disk 14 SW Pacific (x5)
 - Disk 15 HRPT (Peter Hayes article, RIG29) (x7)
 - Disk 16 APT, various (x3)
 - Disk 17 FengYun and Okean (x3)
 - Disk 18 HRPT: various by Marciano Righini (x9)
 - Disk 19 HRPT: various by Marciano Righini (x9)
 - Disk 20 HRPT: Set of 5 channel HRPT by Peter Hayes + Greenland (x6)
 - Disk 21 HRPT: various by Peter Hayes and Marciano Righini (x7)
 - Disk 22 HRPT: various by Tom Loebl (x5)
 - Disk 23 Space: Shuttle + Mars (x3)
 - Disk 24 APT of Arabia + PDUS Globe (x3)
 - Disk 25 PDUS: various by James Brown (x4)
- All pics are in PC GIF format; mostly 640x480x256 levels. Some are up to 1024x768x256 levels. (All VPIC compatible.)*

SHAREWARE PROGRAMS... Viewing/tracking programs, etc. (zipped)
(PKUNZIP unzipping program included on all Shareware Disks)

- Disk 99... VPIC v.4.8 (viewing program, GIF, RIX, PCX, etc.)
IMAGE PROCESS v.1.0 (GIF editing program)
PCTrack v.1.1 (Satellite tracking program, simple to use)
GRAPHICS WORKSHOP v.6.0 (viewing/conv. for GIF, etc.)
- Disk 99A... PCTrack v.2.1 (latest version, but more complicated to use)
EDSAT v.1.6 (program for manipulating NASA 2-line files)
ELEMENT MANAGER v.1.8 (management for 2-line and Amsat)
IMAGE DISPLAY v7.4 (viewing and manipulating program)
VGA CAPTURE v.8.0 (resident screen capture program)
- Disk 99B... WINGIF (viewing program for GIF via Windows3 & 3.1)
PAINTSHOP (another viewing program - Windows3 & 3.1)
GEOCLOCK (Graphical map showing daylight areas, etc.)
LEARNORBIT (Teaching program about orbits)
WX v4.3 (Weather forecasting program)
GIFDOT2 (GIF printer routine for dot matrix printers)

You will need a viewing program to see the GIF files; VPIC is recommended for starters. It is supplied on Disk 99 in zipped form. To use zipped versions of any of the programs... make a directory or subdirectory on your hard disk where you want the program to reside (i.e. C:\VPIC) and unzip it into the directory as follows:

PKUNZIP <filename.zip> <Hard drive letter:\directory or subdirectory>
(i.e. PKUNZIP VPIC46 C:\VPIC).

Next read the Doc and Readme files to enable you to configure it to suit your video card and machine.

Remember that some of the images may lack contrast and brightness. As most of the files supplied are in their original form, 256 levels, you will probably have to use the contrast and brightness keys on your viewing program to set the levels to your own preference. This can make a world of difference to the finished picture. Remember that if you resave the .GIF file after altering the brightness and/or contrast you will always lose some of the original data. This is the main reason for us supplying most of them in their original form.

How the system works: All disks will be copied for members free of charge, providing blank formatted disks are sent to me, **with return addressed label and return postage. Maximum of 6 disks at any one time.** Read on...

Please send extra stamps to the value of £1.00 or a £1.00 coin to enable me to return overseas members' disks post free. (No small cheques please; the Bank takes most of it in charges). This small charge also helps towards the running costs, purchase of disks, stationery, etc.

Overseas Members: As above, but return post is free. I would appreciate any good polar orbiter GIF files you have for the Library.

Most Library disks have approx. 1.2Mb on them; **the best format to send is 1.4Mb HD 3.5"**. All other PC formats, 1.2Mb, 720kb and 360kb, can be copied to, but you won't get much on a 360kB! *Only legal PC formats please. None of those drilled out 720kb, etc. formatted to 1.44Mb!*

While we will take steps check master disks of GIF and Shareware and upgrades, RIG and it's officers will not be responsible for any viruses found.

UPGRADES...

PC-SAT3 Upgrade disk. July 91, as mentioned in RIG24, including MET3-4. £3.00 handling charge, state disk size required.

NEW...

PROSAT-II Upgrade disk, September 1992. All previous upgrades, plus Swap IR/VIS on Noaa, plus minor fixes. SNOISE included on disk. £3.00 handling charge, state disk size required.

SNOISE, Signal to noise measuring program for Meteosat (for ProsatII system only) Send disk and return S.A.E.

TIMESTEP HRPT DEMO DISK, 1.4MBt. £3.00 handling charge.

All upgrades available only from the Chairman.

THE SOVIET & CHINESE SCENE

PETER WAKELIN

At the time of writing, in late October, METEOR 3-5 is the only Soviet weather satellite transmitting APT imagery. However, the northbound passes are precessing towards dawn and it will become useless for visible imagery at European latitudes during November.

Hopefully, METEOR 3-4 will take over and provide visible images into December but that one's sub-satellite point will also become under-illuminated early in the month.

The situation should improve in January when both METEORS 3-3 and 3-5 become well placed but there may be a few weeks around the winter solstice when little or no visible imagery is available. Even NOAA 11 will be poor this winter as overhead passes are about 40 minutes later than a year ago and occur within an hour of sunset at the latitude of Britain.

I have not heard signals from a series 2 METEOR since late July. METEORS 2-19 and 2-20 have both passed through periods of good illumination without being switched on so it is possible that neither of them is now operational. Short bursts of 120 lines per minute scanning heard by John Murray in early October could not be attributed to any known METEOR.

What does the future hold in store for the Soviet meteorological satellite programme? We know that cost is now an important consideration in their planning. We know that METEOR 2-20 was the last in the old series and we know that a geostationary weather satellite (GOMS) is in preparation and should be in place during 1993.

There is also plenty of evidence lying on the shelves of the National Meteorological Library at Bracknell that they make extensive use of the NOAA satellites. With the US Total Ozone Mapping Spectrometer launched aboard METEOR 3-5 last year and further joint projects planned, US/Soviet co-operation has resumed.

Geoff Perry thinks it is possible that the METEOR polar orbiters could be phased out. He believes that the needs of the CIS could largely be met with a GOMS over the Indian Ocean and OKEAN-type spacecraft monitoring the ice situation in the far north.

In the longer term a truly international Earth monitoring programme will no doubt evolve. With the veil of secrecy gradually being lifted and with greater international co-operation the element of surprise in Soviet launches will diminish.

Feng Yun 1-2 telemetry has been heard during October but the APT frequency has remained silent. A spell of continuous sunlight lasting several weeks has probably charged up its batteries.

BOOK REVIEW: THE WEATHER SATELLITE HANDBOOK - DR R E TAGGART

Reviewed By Simon Lewis GM4PLM

Having seen and read the old edition of this handbook, it was a great pleasure to see this latest revised edition. Although of American origin, this book contains a lot of information that is of use to anyone interested in WXSAT reception and remote imaging.

The Book runs to over 200 pages and is in the normal A4 format. The paper quality is excellent and the text easy to read. The book is well illustrated, with many diagrams and photographs to accompany the texts.

Chapters in the book cover:

Operational Satellite Systems, WXSAT Antenna Systems, WXSAT Receivers, Video Formats and Display Systems, WSH Microcontroller, Scan Converters and Computer Interfacing. Satellite Tracking, Station Operations and Advanced Applications.

There are 3 large appendices covering Parts and Equipment Suppliers, Scan Converter Parts Listings and BASIC listings for the WSH1700 controller card. Almost all of these suppliers are American in origin.

Most of the chapters contain information of relevance to European users, however, you must always be aware of the books origin, especially where mains voltages are concerned. The scan converter and WSH1700 microcontroller mentioned in the book could be easily built by European users, as it uses parts easily obtainable on this side of the Atlantic.

The programs and PCB's are only obtainable from the suppliers in the states and prospective constructors should be aware of the need to order parts from the USA, although this should pose little problem. Apart from the books US origins which could cause a few problems, the book is very good and contains some useful projects to build, including a 2400hz scan detector similar to the one described in RIG magazine sometime back.

Overall the book is very good and of interest to anyone involved in Remote Imaging. Thoroughly Recommended.

Available from RSGB Books or via AMSAT-UK.

BOOK REVIEW: SPACE RADIO HANDBOOK - JOHN BRANIGAN GM4IHJ
Reviewed By Simon Lewis GM4PLM

Although not entirely devoted to Remote Imaging this latest book should be held by anyone remotely (pun not intended!) interested in any satellite activity.

This publication by RSGB books runs to over 240 pages and is literally bulging with facts and information on many satellite topics. The book contains chapters on:

Radio Physics, Satellite Orbits and Tracking, Satellite Radio Reception, Amateur Radio Satellites, Weather and Experimental Satellites, Experiments in Space Radio, Man in Space, Space Radio Computing, Meteors, Comets, Moons and Asteroids, Amateur Radio Astronomy and the Future of Amateur Radio in Space. I did say it was comprehensive!

The book also has an appendix of useful addresses, although of some these are very out of date! A glossary of satellite terms is also included for those new (and some not so new!) to the satellite game. The WXSAT section covers the reception of NOAA and METEOR series of satellites, as well as the METEOSAT geostationary observation satellites.

The book also explains about picture reception and display, as well as picture decoding software and hardware. It should be noted however that this section is not very comprehensive, but to be fair to be fair, you can devote a whole book to this subject!

One interesting section covers the use of geostationary WXSAT's as viewing platforms for astronomical objects, maybe someone can come up with some more information on this interesting phenomenon.

This latest RSGB book is well written by that space 'guru' John Branigan GM4IHJ. Having met him on occasion before I can assure you this man knows his satellites!

I can thoroughly recommend this book. I have had mine for sometime now and its already well thumbed! Simply it's one of the most comprehensive books on satellites available at this time. You can't ever afford to be without it if you are the slightest bit interested in any satellite topic.

Available from RSGB Books or via AMSAT-UK.

KEPLER ELEMENTS

MAX WHITE

NOAA9									
1	15427U		92300.90816421	0.00000015					2328
2	15427	99.1322	330.7150	0016101	104.7885	255.5120	14.13442083405827		
NOAA10									
1	16969U		92300.91639306	0.00000090					800
2	16969	98.5309	316.7331	0012255	278.0308	81.9488	14.24714379317410		
NOAA11									
1	19531U		92300.89100755	0.00000150					9835
2	19531	99.1001	266.4863	0012427	18.4145	341.7476	14.12759103210733		
NOAA12									
1	21263U		92300.87655132	0.00000192					4349
2	21263	98.6848	328.8741	0013142	166.0615	194.0931	14.22126137	75488	
MET3-2									
1	19336U		92303.23469825	0.00000063					19
2	19336	82.5454	25.3787	0016960	315.9250	44.0515	13.16951756204819		
MET3-3									
1	20305U		92303.60120918	0.00000043					6828
2	20305	82.5511	327.5469	0017192	333.5421	26.4822	13.16004865144772		
MET3-4									
1	21232U		92303.82303476	0.00000043					3348
2	21232	82.5424	230.6161	0017443	250.9429	108.9803	13.16811897	73000	
MET3-5									
1	21655U		92303.67425545	0.00000043					3825
2	21655	82.5591	177.3102	0012477	245.9910	113.9906	13.16811411	58080	
MET2-17									
1	18820U		92304.25811583	0.00000197					8332
2	18820	82.5408	21.8007	0019173	51.6549	308.6331	13.84659290240026		
MET2-18									
1	19851U		92303.80207906	0.00000054					7820
2	19851	82.5184	258.5729	0015255	91.7386	268.5534	13.84302209185317		
MET2-19									
1	20670U		92303.52379955	0.00000063					5327
2	20670	82.5471	321.5925	0017089	21.9666	338.2224	13.84144295118214		
MET2-20									
1	20826U		92303.84087449	0.00000059					5324
2	20826	82.5225	259.6301	0012628	283.5678	76.4071	13.83515495105430		
FY1-2									
1	20788U		92298.41866192	0.00000000					4793
2	20788	98.8930	325.3014	0014545	244.4711	115.4953	14.01301192109565		

(No excuses for listing all the Mets as we cannot tell which will be on!)

An explanation of the 2-line format for those who wish to convert or update their Amsat format files... In order, the blocks of data represent the following...

Line 1 : NORAD sat.number - Epoch date - Decay Rate - Checksum

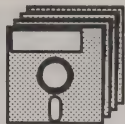
Line 2 : NORAD sat.number - Inclination - Right Ascension - Eccentricity - Arg.of Perigee -

Mean Anomaly - Mean Motion (8 decimal places) - Revolution No. - Checksum (1 digit)

(Note: The Eccentricity has a leading decimal place which is not shown but assumed.)

SHAREWARE CORNER

MIKE GOODALL



GIFDOT2

At last a shareware program designed to load and print GIF files on a dot matrix printer. A clean, new ribbon, is essential for the best results, and the double-pass option may help on some pictures. While the best results cannot be compared to prints from Laser and Bubblejet printers, it is a useful program for those who only have a dot matrix printer. It will take GIF and PCX files (as well as a few others) up to 2kB x 2kB x 256 colours, and uses error distribute dithering techniques. Supports SVGA up to 2kB square by 256, but can also be run on a PC, without a specialist video card that would be needed to view the large 2kB x 2kB GIF files! Works in conjunction with VGACAP which is included in the ZIP file. It will work with any Epsom FX80 compatible printer as well as Laser printers with Epsom FX80 emulation. Also included are three small GIF files for you to experiment on. You definitely need to read the DOC file for this one.

JVFAX v5.0

This may be the answer to all those dreams for a simple way to receive FAX, APT, WXFAX, etc. The Docs are in English and German and contain a very simple interface to the Serial port of a PC, a 741 ic, resistor and capacitor. (Read the README.1ST doc before connecting!) Although this works, the more extensive interface is recommended by the author, and circuits can be obtained from his German address. The program can even receive Amateur Slow-scan TV! Most video cards can be supported, up to SVGA on a ET4000, and a printer dump is even included. This program has been written so that the software itself does most of the work, requiring only the simplest of interfaces, so you may have to compromise when setting up the software if your machine cannot handle the data from your receiver fast enough. However, all is explained in the comprehensive doc files. I can remember programs in the past that used this type of interface to receive FAX on shortwave bands, but this is the first I have seen that deals with APT and slow scan TV. If it works well, let us know!

Both these programs available on Disk99B

MEMBERS' LETTERS



[Any letters sent to the Editor, Make-up Editor or Committee are assumed to be available for publishing in the Newsletter, unless otherwise specified.]

Dear Editor

I read with interest the letter from Graham Woolf extolling the virtues of the Archimedes. His letter marks a significant departure in "PC versus everything else" discussion, in that it is a letter, not an advertisement (or is it?). I simply must put the record straight by way of the letters column. I have chosen to include full specifications and prices to accurately reflect the differences in computer platforms.

It may be true that Timestep have the monopoly on the Weather Satellite market, but this is what free enterprise is all about. Timestep appear to dominate in both the American publications Weather Satellite Inc and Weather Satellite Report, probably because of their product range. In fact to the best of my knowledge they are the only supplier of amateur PDUS systems.

I have to admit the animation on the Archimedes does seem to be better than the PC, at the moment! In contrast though, the PC will accurately Grid NOAA polar images and provide Temperature Calibration as well.

Graham talks about the multi-spectral imaging of the Archimedes, however to do this requires an additional video card and only supports 65,000 colours at 416 x 328. The PC using a "Genoa ET4000 Hi Colour 24 bit DAC" can support 16.7 million colours at 640 x 480. This really is 24 bit colour with no restrictions.

The A5000 as it comes, only displays 16 shades of grey, the video enhancer card is essential. Acorn list the A5000 with 4Mb RAM, 120Mb hard drive, 14" colour monitor, mouse and operating system for £1599.00 + VAT add to this the extra video card at about £150.00 totalling £1749.00 + VAT.

The speed question is unfortunately a Red Herring as even Acorn admit that a 33Mhz 486 is faster. A RIG advertiser, Prologue Computers offers a 33Mhz 486, 4Mb of RAM, both floppies, 800x 600 14" colour monitor, 125Mb hard drive, Genoa 7900 24 bit video card, DOS 5.0 and a mouse for only £1195.00 + VAT.

So in a nutshell the Archimedes costs £554.00 (+VAT) more, has lower resolution, has less colours, is slower, does not grid NOAA, does not temperature calibrate NOAA, cannot receive HRPT, cannot receive PDUS, but will animate more than one section, which will you choose?

B. Smith, Bury St Edmunds

Dear Sirs,

I know the task of the Kettering Group who have successfully tracked Soviet space flights for more than 30 years. In the same way I know the 'Remote Imaging Group Newsletter', published by the Kettering Group.

Does anyone know of any other material (bulletins, books, etc.) about the Soviet Space Programme?

Alfredo Rosado Bartolomé C/. Diagonal 53, 28409 Los Negrales (Collado Villalba), MADRID, Spain.

[Ed. Teledyne Brown Engineering do a comprehensive year book, obtainable from Colorado Springs Office, 1250 Academy Park Loop, Suite 240, Colorado Springs, Colorado 80910. Perhaps if Geoff Perry is reading this, he might know of other publications.]

Dear Sir,

Quick! Send me a ProsatII at £122 inc. before the man Cawley comes to his senses!

I've struggled on for long enough with a home-made interface card (which only works when the wind is in the east and there's an 'r' in the month) and home-brew Pascal software (which oddly enough only seems to work when there isn't an 'r' in the month!). At this price I shall suffer no more.]

Let me add approving noises made by other RIGleys in congratulating all (for I know there are many) in the new format newsletter. There's a thought - time to stop calling it a newsletter - it's now a fully fledged magazine.

Does the brief of RIG extend to FAX reception also? I for one would like to see more articles on this - particularly regarding hardware (here I go again!) or software for the PC.

Another tiny improvement would help modem-less users a great deal. Each edition you publish the 'latest' Keplers, but you don't mention just how 'late' they are! Sometimes, I come across other Kepler elements, but I can't tell which is the more recent. Is there something in the Epoch?

[Ed.- The first two numbers of Epoch are the year, the remaining numbers are the day, immediately followed by the time expressed as a part of the day, usually to seven or eight decimal places. e.g. 92143.8874513 would work out as 1992, day 143 (about May 22nd.) and late evening!]

And one last point that might help you - or James Brown. Many of us have PC's now, (dagger looks from die-hard frame store junkies) often with some form of well recognised Word Processor package. Many of the articles in the, er, magazine are of considerable length and I cringe to think of some poor fellow having to type pages of the stuff back into Wordperfect, or whatever. A statement as to preferred WP formats for longer articles might save many worn digits!

HRPT? PDUS? I don't think I'll get that one past the finance committee for a while yet. Or the neighbours for that matter. Curtains twitched like nobody's business when the cross-dipole went up - what will they make of a lunatic pirouetting around the garden pointing a giant wheattie bowl at the sky, for heaven's sake?!

Maybe once I've cracked ProsatII, I'll drop an article along the lines of 'A brief History of Weather Satellite Reception in Hinckley' to the Editor. It's all that bloke Lawrence Harris' fault. I only went to Smiths looking for a magazine or something to read up on scanners. And there was this rag called Short Wave Magazine, and some articles about Space and Pictures and stuff. Wow, I thought!

Enough already. The back's off the PC, acres of hard disk cleared in anticipation and the Deskjet500 fired up and ready. Feed me!

Laurence Wilkins, Hinckley, Leics.

Dear Editor

I must say that I am greatly offended by the letter from Graham Woolf in RIG 30. He accuses me of biasing RIG as a result of my election to the committee.

Does Mr Woolf seriously think that if I was not on the committee that I wouldn't have developed PROsat II, HRPT, PDUS and Multi Spectral View?

Mr Woolf obviously does not know that one of Timestep's best selling systems is indeed our ARCSat. We sell this very simple to use system in education to run on any Archimedes platform.

We have products to run on the Apple, the Atari, the Amiga, the Archimedes, the PC and don't forget the Timestep Framestore !

The reason that Timestep concentrate solely on the PC in RIG is that RIG members have the freedom of choice regarding which computer. They chose the PC. If RIG member chose any other computer then Timestep would produce similar systems for whatever was in use.

Mr Woolf falls into the trap of saying the Archimedes has speed and good graphics but does not actually specify these. The PCATS Graphics Enhancer although having a 24 bit pallet, will only work at 416 x 326 in 16 bit colour giving just 65,536 colours.

The PC will display at 640 x 480 in 24 bit colour, however as there are 307,200 pixels on the screen this limits the number of colours to this figure, which is still nearly five times more than the Archimedes. So we can see that the PC has the definitive edge over the Archimedes.

Speed is another problem. Lets be clear over the PC compatibility issue. Landmark is the speed utility that all PC manufactures use to check speed

performance. It is therefore a useful check on both the Archimedes compatibility with DOS programs and to asses it's speed. However Landmark 2.00 will simply not run on the Archimedes !

Landmark 1.16 gives a speed of 1.0Mhz in single task mode and 0.7Mhz in multitasking mode. Compared this to a cheaper 33Mhz 486 PC at 115Mhz.

As for running "Windows" in a window; Microsoft Windows 3.1 simply does not run on an Archimedes !

I hope that this letter has corrected some issues and I would like to assure readers that Timestep always has their best interests at heart. Any new ideas for products will be given serious consideration.

Dave Cawley

Dear Editor,

I think the idea of a GIF picture library is a great idea. Can I point out to members who use Acorn computers that they also can have access to this gold mine of images. The GIF images can be accessed from a PD disk by !MultiFS or directly by machines fitted with RISC-OS3. They can then be converted to sprites for viewing by one of the two excellent conversion programmes available.

!Translator is a programme which multi-tasks and does its work very fast. It has a huge list of pixel based file types which it will understand, including .BMP, .PCX, Cadsoft (the same as the .SCN format), GIF, TIFF, MacPaint among the 30 it lists. A companion programme, !Greyedit, adds image enhancement to the repertoire including histogram equalisation, dynamic range expansion and sharpening. The programme is shareware and is often found in the PD libraries, but if you are interested in this programme then I strongly suggest you register with the author by sending a disk, an SAE and £11.00 to:

John Kortink,
Middelhuisstr. 17,
7482 EL Haalsbergen,
The Netherlands.

Very similar in operation is !ChangeFSI which also has a similarly vast range of accepted file types (36 in all) and includes image enhancement within the one programme. !ChangeFSI is available from Watford Electronics when you but a 256 scanner, otherwise, I believe you have to contact Acorn to get a copy.

On a different tack, Acorn owners who have a framestore might like to think about the new £50 video digitiser recently made available from HCCS Associates, as a way of storing images made by their framestores. I have found this very inexpensive piece of kit to be very accurate and user friendly. You simply pop the video output of your unit into this card and

your framestore images appear on the computer screen. At present it has a resolution of 640 x 250 lines and a 500 line version is due out soon allowing both of the TV fields to be stored. The two image processing programmes above can then be used to manipulate the grabbed images.

David Woods Glasgow

Dear Ed,

Thanks for another very interesting RIG mag received. I have been receiving weather satellites for many years using the RIG framestore but I have just purchased a second-hand Amstrad 2286/40 with Dos 4.0, Microsoft Windows and Smartdrive installed on the hard drive.

Could I through your pages ask if anyone is using the Timestep Prosat II and Track II programmes on this computer?

The received pictures of MET and NOAA sats are received OK and build up on the screen to give a good picture, but if I save or zoom in I end up with several bands, about 4 or 5, 1/4" wide of shifted picture in the top half of a MET picture.

On a NOAA picture a small band near the bottom on a north bound and the top on a south bound orbit.

This shifted portion seems to be the bottom part shown again. Not very easy to explain, but someone might know the answer, also with Track II I have no mouse arrow indication.

Thanks for any help received.

*P.W. Lee,
190 Chaldon Way, Coulsdon, Surrey. CR5 1DH. Tel: 0737 554388*

Dear James,

I have been a member of RIG for just about a year now and like most people started with some fairly cheap kit, Maplins receiver, framestore etc. Once you realise what can be pulled down from above the quest begins to get better and better.

I have, within the last two months upgraded to a Timestep ProScan receiver, and last week to Prosat II to go with my new PC386. The cost of the Rx. and Prosat II being greatly reduced in RIG helped me to make up my mind which way to go.

I have over 50 one hour audio tapes of passes from the last year and since Prosat II I didn't know what I was missing!! At the rate I'm filling my hard disk I'll need a bigger one before I understand how to drive this one.

I can only think of words of praise (no pun) for Timestep and their equipment, so unlike Graham Woolf of Ringwood, I'm all for the link, if any, with Timestep, if it means members can have first class equipment at very good prices. I am now saving for Meteosat equipment, which of course will be Timestep,

Roger Ray, Telford, Shropshire.

P.S. RIG 30 was excellent, keep it up.

[As we have had views expressed from both sides of the fence, we will now consider the Timestep/Amiga/PC issued closed... Editors]

Dear James,

I have been a SWL for 20 years now + VHF, UHF etc., and interested in Satellite for a couple of years now, and with eight RIG magazines under my belt, "only eight?!" OK we all have to start somewhere". I started to receive sat pics with a BBC, got so far as demo disks etc., and thought "I've seen better than this!" with all respect to the BBC of course! Left sats for a while, and now shortly taking delivery of a PC386, Rx, SVGA etc., as the prices are really coming down now! I listen to 'clip-clops' of sats on my Tandy 2006 scanner, which I know is no good for pics, but I listen anyway. I can't wait to see the pics... Back to RIG 30. It fell on the mat Sept 1st, timing or what!! Having devoured greatly, a few comments re contents of mag as I find it.

I find I understand perhaps 50%-60% of items, perhaps not a bad thing, but is this typical or am I thick? Simple things seem to be a problem, example follows:-

1. 'Bulletin Board'. Yes I rang it, it made a funny noise, yes got it wrong again!!
2. GIF Pic library.
3. Shareware Progs (Zipped/unzipped) oh dear!
4. Dissemination Prog Meteosat 3/4. Lots of numbers and letters - what they all mean, don't know. Oh dear!
5. Keplers (Sat No., epoch date, decay etc. Yes OK but what do you do with all this info? Oh dear!
6. Time of AOS of NOAA9,10,11,12 centre pages, why needed if we have Keplers?? Told you I'm a bit mixed up didn't I!
7. Oh well tonight 2nd September NOAA9 on 137.62 good 1808 pass was 1813, OK only five minutes adrift!, but NOAA 10/12 on 137.5 pass 1830, 1831 - nothing came!?! Oh dear!

Right, I'll make myself an aerial, pick up RIG 25 page 65 (Simon Lewis) get the gear, couple of hours go by, I've made an aerial! Now phasing harness, everyone seems to have different ideas, or just comment 'make up the appropriate harness'. Don't understand 'Phasing Harness' LH RH or whatever, put it under the stairs for later on! All these things are simple, I know, but we all have to start somewhere, and I've had enough! There are things I don't understand and I'm going to come clean HA!

Could we have a page listed as beginner's perhaps it would probably bore the old hands, but would be like a shaft of light to the likes of me.

"BEGINNERS PAGE"

Keplers	<i>Why, what for?</i>
GIF	<i>How to use, why, what use?</i>
SHAREWARE	<i>Same.</i>
Bulletin Board	<i>Same.</i>
Phasing Harness etc.	<i>Drawings etc.</i>
<u><i>Drawings to support descriptions!</i></u>	

Simple things everyone is assumed to understand.

Just one comment on RIG30 page 47. There seems to be a crusade against 'Dave Cawley', Timestep etc., being tied up with RIG, to my mind totally unfounded, we all have the freedom to buy what we want, where we want to! We are not sheep, and if Dave Cawley adds to the Mag, that's a bonus, nothing else, Great!

I'm happy with the 50% I do understand, if I knew it all it probably wouldn't be fun any more, I'm keen and definitely not bored.

I don't want answers to any of my questions. I'll pick it all up eventually, I'll keep making the harnesses, aerals and reading the RIG magazine.

Keep up the good work,

Alan Wilkins, Peverell, Plymouth.

[Well Allen... For those who would like some answers, here goes... If you could afford all the back issues of the Newsletter and more importantly the time to read them (weeks?) you would probably find out the answers to all the questions you ask - but this solution is a little impractical! It is a good idea to have raw beginners articles in the Newsletter and we hopefully will be able to do this regularly in future issues. With regard to the items we produce here in Littleport...

The RIG GIF Library is a collection of excellent pictures (from Polar Orbiting and Geostationary Weather Satellites, in APT (Automatic Picture Transmission) and HRPT (High Resolution Picture Transmission) modes. They can be viewed with the Shareware programs available on Disks 99, 99a and 99b. We recommend VPIC for a start. They enable members with Computers but no receivers or Hardware/Software to see the sort of pictures that are obtainable.

Most of the Shareware programs are "Zipped". This means that the file (of say 250kB) is reduced with a simple program (to perhaps 100kB). This means that we can get a lot more programs onto a disk for you. To unzip files, see info on GIF Library page.

The Dissemination Schedule in RIG30 centre pages is for those who receive the Geostationary Satellites Met3 and Met4 (They occasionally use Met5 instead of Met4 with the same schedule). They tell you what sort of

pictures; Visible, Infra-red images, etc., and which section of the globe is being displayed.

The Keplers are published for those with Computers or Programmable Calculators to enable them to predict accurately the times that polar orbiting satellites are to be heard. Most tracking programs are in Shareware form, but there are a few, including the Timestep one that you can purchase. If you own a computer, a tracking program is a must.

The NOAA Predictions are published for those who have no computer, or simply want an approximate time for the NOAA satellites. A few minutes either way may not be important if you are at home when receiving pictures.

The reason why you did not receive a NOAA10 or NOAA12 may be because one of them may be switched off. As NOAA10 and 12 are on the same frequency (137.50MHz) and NOAA9 and 11 are also on the same frequency (137.62MHz) it is necessary to disable one satellite when they are covering the same portion of the globe at the same time. Otherwise, you would receive two signals on the same frequency at the same time, and consequently get a mess on the screen. Normally NOAA9 and NOAA10 are the ones switched off as they are the oldest. In a few days or so they drift apart and are switched back on again.

Although not my Pidgeon, (thank goodness!) the Bulletin Board is a device and program within a computer at Henry's which is connected to the Telephone line. If you have a Modem in your Computer and connect it to your phone line you will be able to talk to it with your keyboard, as well as Download programs and files from it. You have to have a Communications program running in your computer (often supplied with the Modem) of which there are some excellent Shareware versions. The only drawback is that you have to pay the phone bill!

I hope that has gone some way to answering your queries. That's what we are here for! By admitting that you don't understand it all (and we were all beginners at one time) you have probably supplied others with the questions they have always pondered about, but never had the courage to ask. Thanks! Mike]

Dear Editor,

As I am now retired I thought I would attend classes for the RAE and morse in an attempt to obtain a licence to pursue the hobby of radio ham. Little did I realise then what a fascinating journey I had embarked upon.

Firstly, I had gained some experience of radio and morse during my national service in 1946 and was fortunate enough to obtain my licence earlier this year. Well, having got the coveted piece of paper what now? I had then been introduced to what were to me then, meaningless terms such as SSTV, Packet Radio, AMTOR, AMSAT etc., etc., and somewhere, loosely connected with the word AMSAT, 'weather satellites'. Of all the branches of ham radio this lit a spark brighter than the rest. I scanned the magazines for information. RSBG had no books on weather satellite reception, but I did

see Dr. Taggart's book, 'Weather Satellite Reception', advertised in I think, Practical Wireless, and obtained a copy from which my interest swelled. Following phone calls to RSGB and AMSAT, I discovered a specialist group existed named RIG, and in the RSGB Call Book a phone number leading to my becoming a member and many phone calls to our chairman Henry. Henry introduced me to a local member, Gordon Sharpley who has been a tremendous help setting me up with my station and now having received my first NOAA pictures I am well and truly hooked!

I am writing to you with the express purpose of thanking Henry and Gordon. Henry for his help, advice, and prompt attention, in dispatching my orders, and Gordon for his invaluable help, without which I would have been lost. I also feel it appropriate to extend thanks to all the committee members for their hard work in running the group and producing such an excellent news letter. Keep up the good work.

Norman Johnson, GORGQ, Worsley, Manchester.

Dear Editor,

During the recent storms here on the Isle of Wight, my Timestep NOAA Pre-amp suffered damage, albeit the aerial was disconnected at the pre-amp input. On 8 September at 15.30 hours I posted it to Timestep, and at 0800 hours on 10th September, just 40 hours later, it arrived back repaired.

Congratulations to Dave Cawley and his staff for providing such an excellent service. Well done. This is the more remarkable since often the 'bit of water' which separates us from the mainland introduces a postal delay of 24 hours.

A.F. Bareham, C,Eng., MIEE, Shalfleet, Newport, Isle of Wight.

Dear Henry,

Please send PCSAT3 at the reduced price of £45.00. It has become 'dirt' cheap now because of the further 15% reduction. I don't know who to thank for this! The President of the Deutsche Bundesbank, the Bank of England, Mr. Lamont, or the EMR. Everybody seems to blame someone else.

The newsletter is becoming more and more professional! Thanks to everybody who puts so much work into it. It is really great.

Jan Jager, The Netherlands.

Dear Henry,

Thank you for the Proscan Receiver and ProsatII recently received. Also the info about the Data DIN socket, which was invaluable. I would never have known about it.

It is disappointing to learn that you have never supplied a schematic. There are ways and means to prevent 'poaching' by unscrupulous people, and the users should be given weight. If Timestep's view generally prevailed, then there would be no circuits for TV's, CD's, Amplifiers or any other consumer electronics!

Please put this opinion to them. At the same time, I am very impressed with the performance of the receiver. It has by far the best sensitivity of any WESAT Rx I have used, and the resulting picture quality is excellent. The software is also first class, and I am delighted with the results. All features work as described.

Geoff Chapman, VK2AIT, NSW, Australia.

Dear Henry,

I joined RIG on last Saturday at the BARTG rally at Sandown Park. Could you please pass on my thanks to all the hard working people on the RIG stand for their help and patience with putting up with dumb questions from newcomers like myself; it might help everyone if a dead simple (bomb proof) leaflet was produced to get people started.

Terry Brown, Dover, Kent.

[We do have an Information Pack for those just beginning, available at the rallies, if we don't run out of them by the time you arrive! Mike]

Dear Henry,

I have been looking with envy at the Timestep PDUS offer in the magazine, but the mind boggles imagining a 1.6M dish in the back garden. Maybe I'll try the HRPT first using my present dish and some means of steering it.

The latest issue of the magazine is excellent, as usual; I do appreciate the work that you and your team put into RIG, although I am sure that I am not aware of 'half of it'.

Peter Kinghorn, Newcastle upon Tyne.

BULLETIN BOARDS:

There are now operating, 24 hours a day, two Bulletin Boards that you can use to download Keplers and get other information regarding latest developments in the Weather Sat scene. The Keplers are updated every week and are in Amsat and 2-line format.

The RIG BBS is on 0945 85666.

The Timestep BBS is on 0440 820002.

The protocol is the normal standard, 8 bit, no parity, 1 stop bit.

STOP PRESS... Demo Disk of OFS WEFAX is now available on RIG BBS.

RIG AT RALLIES



Below is a list of rallies attended by RIG this year. We hope to attend these again next year, and will be pleased to see you. For further details ring Henry.

Sandown (AGM)	March 6
Picketts Lock	March 13-14
NEC (2 days)	May
BATC (Harlaxton)	May
Spalding	June 16
Elvaston Castle	June 13
Longleat	June 27
York	July
Woburn Abbey	August
Lincoln	September
BARTG (Sandown)	September
Peterborough	September
Leicester (2 days)	October

We are always pleased to see volunteer members at these rallies, especially those who live local to the event, who can help on the stands, and give the regulars a small break during the day.

IMPORTANT... If you visit a Rally in order to purchase RIG goods please give Henry a ring a couple of days before, so that he can put them on one side for you, as only small quantities are normally taken.

A quarterly publication for hardware, software and applications of WEFAX, APT, VAS, HRPT and GOESTAP.

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RIG HELPLINES



General Enquiries	John Tellick	081 390 3315
Meteosat information		
NOAA information		
Supplier Complaints		
A copy of the Group Rules can also be obtained from John Tellick		

Russian, Chinese satellite information/status	Peter Wakelin	0344 23200
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Schools Education Co-ordinator	John Tellick	081 390 3315
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Schools/	John Murray	Torquay	0803 217754
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Educational Enquiries	Frank Bell	Godalming	0483 416897
	Tom Walter	Reading	0734 871330
	Bob Coombes	Haslemere	0428 642930
	John Din	Bristol	0454 773387
	Alan Wright	Norwich	0603 713449

Framestore	Mike Coombs (7.30pm-9.30pm)	0530 243494
Technical Support		

RIG MICRO SPECIALISTS:

PC and Compatibles	Dave Cawley (after 6.30pm)	0440 820040
PC and Printer Problems	Mark Pepper (office hours)	0494 471111
		(Ext.2133)
BBC Micro	Enquire via John Tellick	081 390 3315
Commodore Amiga	Chris Pretty	0420 82752
Atari ST, Archimedes	Peter Newman	0487 812121
PCSAT3 and PROSATII	James Brown	0656 782632
HRPT and Primary Data	Dave Cawley	0440 820040

NOTE: We are very grateful to the above members for offering their services to the Helpline. Please do not abuse the service by ringing them for queries other than those listed against their names.



* ALL PRODUCTS FOR SALE TO RIG MEMBERS ONLY *

All prices shown include post and packing except where marked

Receiving Equipment

	UK Price	Overseas Price
RIG DARTCOM Meteosat Downconverter. Assembled and tested module in tin plate box	£147.00	£126.00
Complete, assembled and mounted in weather-proof box.	£183.00	£158.00

RIG DARTCOM VHF Scanning Receiver. Assembled and tested module, with LED channel number display.	£128.00	£110.00
As above, but with LCD frequency read-out instead of LED channel number display.	£169.00	£145.00

*Both the above items are modules and require a box,
together with several components, switches, etc.*

RIG TIMESTEP PROscan Receiver.	£164.00	£141.00
<i>See main advertisement.</i>	<i>Special Rally Price</i>	<i>£160.00</i>
(Note: Price rise after 1st January 1993)	£189.00	£163.00
	<i>Special Rally Price</i>	<i>£185.00</i>

RIG VHF Preamp. Includes a bandpass filter and is ideal for mast- head mounting. Assembled and tested module, only needs boxing.	£16.00	£15.00
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RIG 1695MHz Low Noise Amplifier kit. <i>Experienced constructors only.</i>	£28.00	£25.00
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Computer Software/Hardware

RIG TIMESTEP PCwSAT III, IBM/PC Comp. System.	£ 52.00	£ 45.00
<i>See main advertisement.</i>	<i>Special Rally Price</i>	<i>£ 49.95</i>

RIG TIMESTEP PROsat II, IBM/PC Comp. System.	£122.00	£105.00
<i>See main advertisement.</i>	<i>Special Rally Price</i>	<i>£120.00</i>

Antenna systems

RIG CROSSED DIPOLES A Turnstile type design, in kit form (<i>available in UK only</i>) incl. P&P	£24.00
(Note: Price rise on March 1st, details in RIG32.)	<i>Special Rally Price</i> £18.00

DISHES (Available in UK only - Prices do not include P&P, see below)

90 cm active area, complete with feed horn and mount, including dish to 2" (50mm) pole bracket. (<i>Limited Stocks</i>)	£70.00
1.2 Metre (dish only), used condition (<i>only avail. from Henry's QTH</i>)	£20.00
1.6 Metre (dish only), used condition (<i>only avail. from Henry's QTH</i>)	£25.00
1.8 Metre (dish only), used condition (<i>only avail. from Henry's QTH</i>)	£30.00

The above prices are for collection from the Chairman, or by prior arrangement from Rallies. For delivery quotation (**90cm dishes only**) ring Mark Clarke on 0787 74128 evenings only between 7.00 and 9.00pm, Fax 0787 475029 or write for a quotation to 9 Park Lane, Bulmer Tye, Sudbury, Suffolk, CO10 7EQ. See RIG28 page 9.

RIG Binders

Available by post from Gordon Fleming, 168 Bythway, Welwyn Garden City, Herts. AL8 1DU. UK Price £4.00 each, European Price £4.50, Outside Europe Price £5.00. Cheques to "REMOTE IMAGING GROUP" please.

Back Issues of RIG Newsletters

	Rally Price	UK Price	Europe Price	Outside Europe Price
RIG 8-11 1987	£4.00	£5.00	£5.50	£6.50
RIG 12-15 1988	£4.00	£5.00	£5.50	£6.50
RIG 16-19 1989	£4.00	£5.00	£5.50	£6.50
RIG 20-23 1990	£5.00	£6.00	£6.50	£7.50
RIG 24-27 1991	£5.00	£6.00	£6.50	£7.50

Note: Prices quoted are for a set of four, including Post and Packing.

RIG 1-7 are currently out of print. Individual issues are no longer available (hardship cases excepted).

Ordering Information

All items are available from the Chairman, Henry Neale (except where marked) and include return by UK 1st class mail (except dishes and Newsletters). Euro overseas sent via Airmail printed paper rate.

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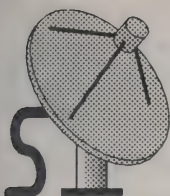
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Tseng Labs ET4000 1Mb VGA Card ADD £36
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125Mb 15ms Hard Disk..... ADD £99
Serial Mouse.....ADD £20
MS DOS v3.3.....ADD £33
MS DOS V5.0.....ADD £49

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VGA CARDS : Paradise 512kb (640x480x256 colours) £52.00
Trident 1Mb (1024x768x256 colours) £49
Tseng Labs 1Mb (1024x768x256 colours) £79
MONITORS : 14" VGA Mono £79, 14" VGA colour £169
14" Super VGA colour £189, 14" Multiscan Colour £233
FLOPPY DRIVES : SONY 1.44Mb £32, 1.2Mb £39.50
HARD DISKS : SEAGATE ST351A/X 40mb £121, 102Mb 15ms £189, 125Mb 15ms £209.

Please call for further information on systems and components (Day/Evening)
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21 West Wools, Portland, Dorset DT5 2EA. U.K. ☎ 0305 822753 Fax. 0305 860483



MSR40 Synthesized Satellite Receiver

When it came to interference rejection, we tested the MSR40 right up to the paging transmitter, not 2 miles down the road!



The result of 12 month's intensive R & D, and rigorous testing, the all new MSR40 is a truly outstanding performer. Designed in accordance with the principles set out in Roger Belcher's authoritative article (RIG27), and fully conforming with his specifications for the highest possible level of interference rejection, this receiver is the measure by which others will be judged.

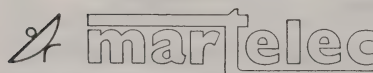
Housed in a custom-designed aluminium enclosure, the MSR40 is both attractive and rugged. Inside, its rigorously designed and tested circuitry ensures that you have the highest performance currently available. If you would like to know more about the MSR40, please call or write.

Features:

- Extremely high interference rejection capability ($> +13\text{dBm}$)
- Fully synthesized
- Attractive, compact design
- Remote control facility
- Mains or DC power
- Separate inputs for Meteosat and VHF inputs
- Meteosat downconverter power via coax feed
- Signal level meter
- Intelligent Search and Scan modes
- Signal Level Output on rear panel
- Constant output level when switching APT/WEFAX

The MSR40 is sold on a money-back guarantee basis.

Price £295
(excl. VAT & carriage)

 *communication systems*

The Acorns, Wyck Lane, East Worldham, Alton, Hampshire GU34 3AW, U.K. Tel/Fax 0420 82752



OMNIPRO 5.1

The Combined Weather Sat and Facsimile package for PCs

Provides up to 1024 x 768 x 256 screen resolution!

Both! In one package, Omnipro gives you the software and interface card for both facsimile and wxsat reception. This latest version of Omnipro has even more features and improvements and represents superb value - especially if your interests span both weather satellite and facsimile reception. The package contains a comprehensive interface card for the demodulation of all satellite and facsimile modes. In addition, the interface contains all the necessary hardware for the optional SSTV and CW/RTTY/ASCII packages.

Separate inputs are provided for fax and wxsat, enabling the permanent connection to their respective receivers. Omnipro runs on any AT machine (286, 386, 486) and some faster XT's (10MHz and faster).

Facsimile Reception

Probably the most comprehensive system ever offered for the reception of facsimile transmissions - decoding all standards found on VLF, through to UHF, including amateur fax, press fax (incl. colour), meteorological charts etc. The package provides automatic scrolling, and caters for IOCs of 144, 264, 267, 353, and 576 and drum speeds of 60, 90, 120, 180, and 240rpm. There is software shift selection to allow for 1900 + 400Hz or 1900 + 150Hz signals. The drumspeed reference is quartz stabilized for accurate and stable image framing, and the images may be scanned in any of four directions.

Weather Satellite Imaging

Decodes Meteosat, NOAA, Meteor, Okean, Cosmos etc. with all sync tones detected. Images are decoded and stored in full 8-bit resolution and displayed in either EGA, VGA, SVGA, or EVGA formats with excellent clarity and definition. Omnipro features fully automatic reception capability, programmable timer, 3D presentation, multi-sequence animation, and superb printer dumps for laser and dot matrix printers.

Price £169.36

(Price excludes carriage at £4, and VAT)

AMIGASAT 2.0

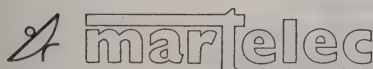
If you're looking for the easiest to use decode package, with the most powerful digital filtering and post-processing utilities, and graphics equalling VGA, then the Amigasat is the package for you. Amigasat has received glowing reviews for its quality software, ease of use, and clear and explicit ring-bound manual.

Unlike other packages, Amigasat performs its baseband demodulation in software, using advanced DSP techniques, storing the image in its maximum resolution. The advantage is that subsequent image processing can be performed more accurately, producing for example, zoomed images with no loss of screen resolution.

As you would expect, Amigasat will display all (weather) satellite types, and is the only software at this level that decodes the digital headers transmitted at the start of each Meteosat image. Continual development of Amigasat means that we are constantly improving and extending its capabilities: As registered users will know, there is a free newsletter and, the opportunity of low cost upgrades (£10), so that they always have the latest version!

*If you would like to know more about Amigasat, or receive copies of the enthusiastic press reviews, please send us a S.A.E.
Demo disks are available for £5 inclusive.*

Price £139.95
excl. Carriage & VAT

 **communication systems**

The Acorns, Wyck Lane, East Worldham, Alton, Hampshire GU34 3AW, U.K. Tel/Fax 0420 82752

RIG - Microwave Modules

PCwSAT III

The first of a new line of low cost Amateur Weather Satellite products from Microwave Modules. It is fully compatible with the RIG PCsat III.

This is a low cost solution to Weather Satellite Imaging on PC type computers. Although extremely cost effective it handles all known APT satellites. It supports all known VGA video cards in all modes. It will automatically animate up to 100 frames and its variants are in use by over 1,000 people throughout the World !

Satellites

We cover all known satellites: NOAA, Meteor asynchronous, Meteor synchronous, Okean asynchronous, Okean synchronous, Feng Yun, Meteosat and GOES. Most importantly there is no Doppler bending of the edges of the image, even from tape ! We deliberately do not use crystal control for the Soviet series as this produces bad doppler bending and no signals at all from tape. Quite simply the handling of Polar satellites is superb ! It is possible to receive GOES (just) in the UK, the transmission standard is slightly different, this is why we do not compromise and have a special setting for GOES.

Animation

Animation is crucially important to satellite enthusiasts. Some systems allow you to animate AFTER the images have been received. We call our system "Stand Alone Animation"; you simply set the computer and walk away. Each image is automatically received and animated. Without touching the computer at all, every time you walk past you will see the latest sequence of frames automatically animating ! Animation is smooth, fills the whole screen and is completely flicker free. You only need 640K of memory as the storage is on your hard disc. Animation is standard, not an option.

Video Cards

We support ALL video cards in ALL modes. Depending on the card used it is sometimes necessary to view the image in different modes after reception. Although we fully support 1024 x 768 x 256 this really needs a 20" monitor to do justice. With 14" monitors the pixel size is less than the shadow mask aperture, so you end up losing data. By far the best mode is 800 x 600 x 256, this gives a non-interlaced flicker free display.

Computer requirements

You can use ANY VGA card in ANY mode, it will work on an XT but a 286 or better will give the best results. A hard drive is recommended. MS DOS is preferred and all features are available on a 640K memory machine. Discs are high density format.

Due to the low marketing costs of Microwave Modules selling through RIG, the price for RIG beginners is just

£49.95 inc VAT plus £2.05 postage.

Henry Neale RIG Chairman
Thornlea Fishergate Sutton St James
Spalding Lincs PE12 0EZ Tel. 0945 85353

RIG - Timestep PROsat II

This system provides the look and feel of Windows 3.1, image processing, 3D, NOAA Gridding, NOAA temperature calibration and full data from NOAA and the Soviet series in a huge 2.4MB file. Reception of ANY satellite can be in ANY VGA mode !

Satellites

We cover all known satellites: NOAA, Meteor asynchronous, Meteor synchronous, Okean asynchronous, Okean synchronous, Feng Yun, Meteosat and GOES. Most importantly there is no Doppler bending of the edges of the image, even from tape ! We deliberately do not use crystal control for the Soviet series as this produces bad doppler bending and no signals at all from tape. Quite simply the handling of Polar satellites is superb ! It is possible to receive GOES (just) in the UK, the transmission is slightly different, this is why we do not compromise and have a special setting for GOES.

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NOAA Gridding and Temperature and Resolution

If you are not sure why these features are important we suggest you read the review in RIG 26 by Rev James Brown. Quite simply you can point to a spot on the image and read its temperature directly, no ground truth data required ! The Gridding will overlay the image with latitude and longitude lines. The mouse is interactive and will give spot lat and long. Combined with temperature, it is possible to simultaneously read latitude, longitude and temperature. This incredible program will store ALL of the data received during a polar pass, both visible AND infrared in FULL resolution. Any area of either sensor can be analyzed in full resolution; you do not have to decide before the image what you want to see.

Features

A built in dithered Laser Dump gives results of outstanding quality, all 32 grey scales are clearly visible from the Meteosat Test Card and the tiny writing is readable ! Histogram equalisation is incorporated to quickly contrast stretch dark or light images. Transects between any two points can be drawn. A median filter removes outlines from Meteosat for 3D projection and remarkably removes spot noise from noisy satellites.

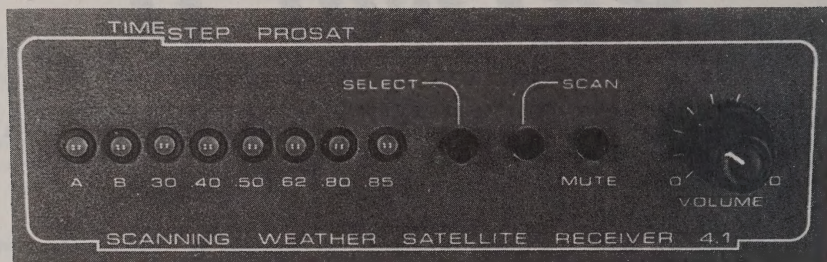
£120.00

inc VAT plus £2.00 postage.

A demonstration disc & colour brochure are available for £3.00

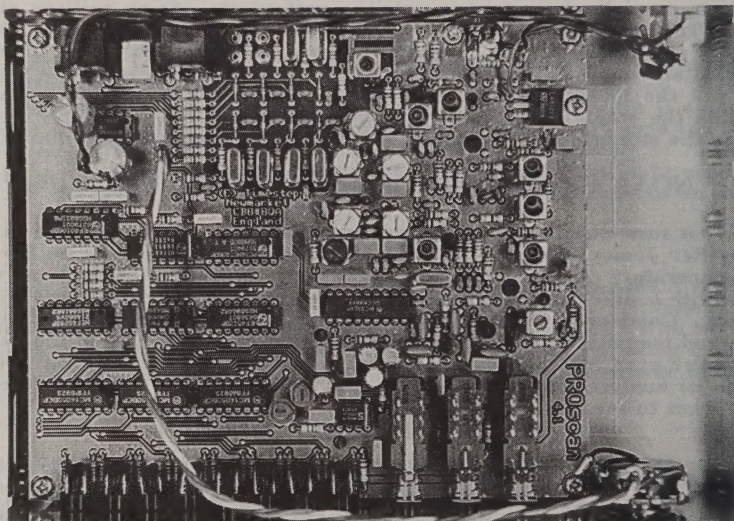
**Henry Neale RIG Chairman
Thornlea Fishergate Sutton St James
Spalding Lincs PE12 0EZ Tel. 0945 85353**

RIG - Timestep PROscan Polar Receiver



What do you want from a Scanning Weather Satellite Receiver ? a) Intelligent squelch that only responds to weather satellites and is quiet when no satellite is present b) To be able to read the frequency directly from the front panel when it stops on a satellite c) To be able to "lock out" unwanted satellites d) resistant to pager interference up to the pager transmitter itself (where of course the field strength is low e) resistant to pager interference at 1 to 2 miles where the field strength is at a maximum f) an unconditional money back guarantee g) A VAT inclusive price

Only the RIG-Timestep receiver offers all this !



The PROscan receiver uses a lot of filtering, 3 coils in the pre-amp (optional), 4 coils in the RF amp (total 7 coils at RF), 3 coils in the oscillator, 1 matching coil at first IF, 5 ceramic filters at first IF, 5 coils at second IF (total 11 IF filters) and a quadrature discriminator for linearity and high ultimate signal to noise. A preamplifier is not required for short cable runs but adds extra selectivity and makes up for feeder loss on longer runs.

£160.00 inc VAT (£185.00 after 1 January 1993) UK postage £4.00

Henry Neale RIG Chairman
Thornlea Fishergate Sutton St James
Spalding Lincs PE12 0EZ Tel. 0945 85353

Timestep

HRPT

Noise free digital HRPT transmissions from NOAA, with a ground resolution of just 1.1KM allow images to be received in incredible clarity. Rivers, lakes, mountains, cities and even small towns can be seen on good days.

Image Processing including variable and histogram contrast equalisation combined with full colour editing give superb results from any image. Colour enhancement allows sea surface temperature and land details to stand out in high contrast. The sophisticated mouse driven software allows all 5 bands to be saved in full 10 bit data and displayed on nearly all VGA and SVGA cards right up to 1024 pixels, 768 lines and 256 colours.

Zoom to greater than pixel level is available from both a mouse driven zoom box or using a roaming zoom that allows real time dynamic panning. Latitude and Longitude gridding combined with a mouse pointer readout of temperature. The image below was received using the HRPT system and 3 bands combined using Multi Spectral View II.



We are offering the complete receiver and PC card for just £499.00, you will need a 0.9M dish (and a way of moving it), a low noise preamplifier, cable and a 286 or better computer with SVGA and a hard drive. This offer is limited until January 1 1993.

£499.00

Timestep Wickhambrook Newmarket CB8 8QA England
Tel. 0440 820040 Fax. 0440 820281

Timestep

PDUS

At last Meteosat Primary Data is available to the amateur. We believe that this is another World First for Timestep ! With the help of Dr John DuBois and Ed Murashie we have at a stroke brought low cost digital imagery in to RIG members homes.

NOAA, generally acknowledged as the best in imaging, has 4KM resolution on its APT transmission and is very infrequent. PDUS by contrast resolves 2.5KM at the sub satellite point AND transmits the whole of Europe every 30 minutes. The whole Earth Disc is transmitted at lower resolution every hour. Imagine looking at the River Nile in 2.5KM resolution, the Aswan Dam is clearly visible as the deeper water shows as a much cooler temperature. Remember this is 2.5KM resolution, NOAA APT is 4KM and simply won't show the Nile anyway ! Look at the Amazon, the River Niger, the Volta rivers, Lake Volta, Rain Forests and much, much more ! The image below is false coloured using the standard built in colour !



We are offering the complete receiver and PC card for just £499.00, you will need a 1.6M dish, a low noise preamplifier, cable and a 286 or better computer with SVGA and a hard drive. This offer is limited until January 1 1993. Don't wait, be first !

£499.00

Timestep Wickhambrook Newmarket CB8 8QA England

Tel. 0440 820040 Fax. 0440 820281